

# The 2019 APL Problem Solving Competition

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- ➤ General remarks
  - Dyalog '19 videos coming soon...

> A review of some submissions

# Many thanks!

- Fiserv, SimCorp, and our anonymous sponsors for your continued support
- Brian Becker and last year's winner Alve Björk for help with problem creation
- Michael Baas and Adám Brudzewsky for website creation
- Jason Rivers for continuous integration wizardry
- Fiona Smith for all the things you do, all the gaps you fill, to make our efforts a success
- > Brian Becker for pulling this all together yet again

#### Phase I

- > New website: dyalogaplcompetition.com
- > Automatic validation: TIO.run
- Loads of great entries
  - 478 total submissions
  - 68 with at least 1 passing entry
  - Surprising number 10/10

P1 Chunky Monkey	P2 Making the Grade	P3 Grade Distribution	P4 Knight Moves	P5 Doubline Up	P6 Telephone Names	P7 In the Center of It All	P8 Going the Distance	P9 Area Code a la Gauss	P10 Odd and Evens
+==(#+)p(t+1+)	{'FDCBA'[1+++165 70 80 90*	{{w[4w:]}{a.j.10+~[0.5+100]	{(w/~~/"(9>>x0><)u},(cu)+(	{v/{1<\$w}}吕,w}"s	{s,/{welld: 1+  dimogue.e"	(ta(atu,=(0[[2+-a-≠u)p" ']	(+/2{(+2)*++/2*-a-w}/w,cow)	{2+= -/(1 0)(0 1)*.{+/*/-1	(u((cw/a),c(-u)/a)2 ±"u)
		{{w,.1×[.5+1000*(+++/)20[2.			{((3 3 3 3 3 4 3 4/1+18),	{(-[2+-a-a[#"W]+tat"W-sw}	(+/,5*=+/"x=-fur(\$:10w)}*s	{2+=1-/++2×/-1 0 1+241 2/1	{(1 0,2) ≠ w){<11w}B'hi'.w}
(n-≠u * (npa/in)s.w} ((≢w)pa!!) <u< td=""><td>('FDCBA'[1+(65 70 80 90)tm</td><td>(n+1000: fw ∘ (a c(.1×[0.5+: ('ABCDF' + (a, (w, [1.5]) ((10+:</td><td>(.18 8)n((+.4")(1 2)("1 2)</td><td>(v/(~1+1+1+1))~g</td><td>((0,(19),(3/2 3 4 5 6),(4/</td><td>(cs-a(1=Em: [0.5]atm + tat</td><td>{+/((**0.5*/)**2)"-ftw(1\$\overline{\psi} (+/\overline{\psi} (**0.5)+/(**2)\alpha -\overline{\psi} ):</td><td>(0.5= -/(+/=/)"(0 1)(1 0)e</td><td>((1.0.2) # w) (cw-0) E0.0.w)</td></u<>	('FDCBA'[1+(65 70 80 90)tm	(n+1000: fw ∘ (a c(.1×[0.5+: ('ABCDF' + (a, (w, [1.5]) ((10+:	(.18 8)n((+.4")(1 2)("1 2)	(v/(~1+1+1+1))~g	((0,(19),(3/2 3 4 5 6),(4/	(cs-a(1=Em: [0.5]atm + tat	{+/((**0.5*/)**2)"-ftw(1\$\overline{\psi} (+/\overline{\psi} (**0.5)+/(**2)\alpha -\overline{\psi} ):	(0.5= -/(+/=/)"(0 1)(1 0)e	((1.0.2) # w) (cw-0) E0.0.w)
(wc=(#w)pat1)	['EDC84'[1+65 70 80 90+41	((a,(-1+#w),0,1*[0.5*1000*)	(	[[v/2v/ u]"ru]	(v=00 "11 11 14801 10651 11	(lubi-12+i+/a) 'adulation	(+/ 2 -/1 0J1+.=+[.1]w,<=w.	[2+21-/(D =1)(=1 D)(+/+/+/14)	(11"(1 0 2 #"w)(re)B's'
(w==0=(a=1)=a -1+1#w)	1'FDCBA'0=c1+65 70 80 9010	((a(-1+#w)(±5 1+100×(-1+#w	(((((*/0 0 <u)×* 9="">u)/u)/u</u)×*>	1(0<+/("1(w)=1(w) sw)	[{w+9×0>w][w+9×0=w] 10+'01;	((-[0.5*a-a] #"t) Pa(t =1) ft-	(+/(10w)((+/(wxw)"(a-w).0.:	(10.5×1-/+/(1+"w)(×*1)(1 T	(((1=21# w)/w)((0=21# w)/w
{((\$\pi)pi=i\a)=\w}	{'FDC8A'[1 + 65 70 80 90 1	{len-fun{a,({(fu)-1},(10+)	(K+,=((*).(*=))/(+)	((([/u+1\$u) ^ (1*\$u)) " s)	{=+/(19)*((w*e) "1" '2ABI	(A-001(([.5=(A(#w)-A)\$Apw.	(+/(+/"(w-(10w))*2)*.5)	(M+(\$w) 2 p = . / wof++/*/0 .	{P+'-' ' 'o{((2 #')w){=w-1
(we=(pw)pat1)	('FDCBA'B-c0 65 70 80 9010	(t, a, 1 = 100 × (+ + + + + ) 0 11 t + {a	(12= =/ (cw)-18 8)	(1*1*,="1*1)"s (*/2*/,w)"s	{((0,19),(3/2 3 4 5 6),4 3	(ta((al[2÷-a+#w)Φatw) sw)	(0.5 +.* = 2 +.* = (x-1**)* ((*/*=2-+1(x-0)*,5w)+.*+2)	[2+-]-/+/*/(0 1*0,[.5]1 0*4	(14 (1 0,2 1# w)(+w)目'
(ωc=(#ω)ρατί) ((0=α -1+ιρ.ω)cω)	[['FDC84'[+/w>0 A5 70 80 90]	'ABCDF' * (a,r,[1.5]0.1**[0.1 ('ABCDF' (a,(e,[1.5].1*[.5*	(10*+/*-w-[s]its s)	[[[ n]	(15./ 1 1+*1 10 8)[(UD, AU	inti-in Sympolo" suid" itat"	(+/2{(+/(w-a)*2)*.5)/w,11gc	(0 5x1-/+ x/":[:1"(0 1)/: /	(((Z # W)(c1+W)EW) add e
		(Dio+0 . 'ABCDF'.a 1.1.1.5.		(1+2=/,)"s	(Dio-0 o walld: swo2+'ADGJMP'	([io-0 . (-0[[2+-a-#"w)4ta	(Dio-0 +/.5x=+/1x=2-/(1+)	(Dio-0 . 5x1+/-/2x/1 0 Ti	([]io-0 o a-880a[-2 #"w] -c
(wc=(#w)pati)	(1-(0 65 70 80 90) · A - ')	((w,10+~[.5+1000×(+++/)w[::	{{((A/(w>0) x (w<9))"w)/w}(c)	{-(.*v)"sw}	{i+(4 7 10 13 16 20 23 27)	(ta((L.5×a+1+1/a.#w)Φatw)"	(+/,5+=+/"2+=2-/1(+,1)sw)	{.5×1+/(a×10w)-(w×10a)}/(4)	({(c(w[:2]=1)/w[:1]).(c(w[
(wc=(#w)pat1)	0 65 70 80 90 ('FDCBA'[aju	'ABCDF' * (a, (w, +0.1=[0.5+10] (5+'ABCDF' * W+(1(8191)w)n)	{(w/~*/"us"ct8}(cw)+,(ф",+	(0€2-/(>Φ)"]w*. «Uw)"⊆	e (wellD: sw o 1+1we (e1f 04	(t(-0[[0.5×a-# w) 0 at w) = s	(+/(+/"(2-/(+,-/)w)*2)*0,5 (+/(+/"(w-(-1+#gw)\psi)*2)*.	(0.5×1-/(+/×/"110 19u)"((ci	(14 (0 1,-2) # 6)(年)目(1 2/
(((a=1)+1=a 1#w)=w) (((pw)pat1)=w)	( ED 05 70 80 901#) N FDCBA	((w,0,1*[0,5+1000*(+±+/),0	(8 5-(1(1 2)(2 1))( 1(*,-))	([v/(u ' ')*' ' u)"e u)	((((((((((((((((((((((((((((((((((((((	[[[-]0.5x+/*[de=" ']de]at"	(+/((u+.=u)=0.5)=1f(u-1\$u)	10 5 m 1 ( ( 1 flu ) ( + / ( m + du ) - m = "	(((2 # w)/w)((-2 # w)/w))
(((a (1≠w)-1) = 0) < w)	((w 0 'FDCBA')" (0 65 70 80	(ten + (≠w) ∘ (( a ((≠w)-1	(A + >,/1(((2) (-2)) ()	(((v/ ((1) + w) * ((-1) + c	(0, w) (. / (w e" ('ABC' 'DEF	(a (a +[((a-(#"w))+2) *(#a	(+/ **(+2) +/" (**2) ((11w	[diagonalAdd + (+/ +/" +(0	(11" ((1 0),(2   #"(sw)))
{((#w)p1=ta)=w}	{'FDCBA'[1+65 70 80 901w]}	(5,0.1×[0.5+1000×(#w)+=-11)	{(2= */"F-cu)/F-,*,,-18}	{(1-##12-, )"gu}	{2,/(we"E' '(#E+)' 0 1 2A	(([0.5-a+a[#"sw)Φat[2]t.sw	{+/(**0.5)+/"(**2)w-1¢w}	[0.5*]-/+,*/"+[1]"(0,"1,"1	((1,0,21#"w)(11"+w)目1,0,w)
(w==0=a 1==1p.w)	{'FDC8A'[1+65 70 80 901w]}	({\a,(1\pi_w),\si\si\00\cdot(1\pi_w)\cdot\ ('ABCDF',(\tau,\in\cdot\3+\si\3\-+\cdot\)	( <u>1</u> w * (2 *   * / \ar - \ar ) 18 8)	{\\/2=/\u,\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\	{"11(±[w, '23456789')[1+w]-	((-0[12+-a-# Ew) Φα+ (atu) +1	(+/{.5*=+/w*2}"2-/wp=1+#w} -((+/2(.5*=-+,x-)/+,1!=)*g)	(L-11-3# wo.5x[(+/x/Letw)-	{(w[12 # w]) (w[1-2 # w])}
(ως=(#ω)ρ1=ια) (ως=(ρω)ρατι)	1'EDC84'[0 65 70 80 90:w]]	'ABCDF' * (a.N 1 * 1.5+1E3 * (!	(9 11:0" (011: sth): s(+ +		(+":0123456789222333444555	ti(-1 5:0(a-#u)datu)":c	{+/ >-/0 10"c1 031+.="tw}	[ 5*1=/= #/#[+[1]]"(0 1)(1	(1 0 2 #")(clip)E99 p
{((pw)pati)=w}	(scoreRange=0 65 70 80 90 1	(grades- 'A' 'B' 'C' 'D'	(diff=(1 2)(1 -2)(-1 2)(-1	(v/"(11"gw)="11"gw)	(letters-'0123456789ADGJ)	(move-[(0[a->+p+, sw)+2 +	(+/(**0.5)+/1(**2)(w)-10w)	[ prodsum1-+/+/0 101.cm +	(mat-((,2 ==0*, "sw)(a w)8
{((\$\part1)cu}	('FDCBA'[1+65 70 80 901w])	(a+ [w.O.1 = LO.5+1000 = w[;2]	{off + .1(w (+ w)}, 2 72 *	{(*/w=1+w, ')"sw}	{keys-'1' '2ABC' '3DEF' '40	{(-L0.5*a-al#"gw)\$ta*t"(.s	(+/(**.5)"+/"((sw) - (1¢sw)	(list-gw o coord + list,co)	{u-'s' 'as' , gw ∘ 1 • 1" (1-2);
	('FDCBA'[(65 70 80 90;w)+1	(1+\$wo{n+1\$wod,m(10+-{0.: (A+pwo{a,(1pw),0.1*{0.5*}	(p+(sw)+,(71 1+,,71 1)+.+()	((*/2#/) s)	{(((e(5p3) 4 3 4)/14:9),0, (e(10]ime"1" '2ABC' '3DEF	((O[]-(a-# sw)+2)+tat sw)	(+/2{0.5+2+/2+2a-w}/wp21+pc	{1+(2+-\$ew)2pew=0.5* (+/*/1 ((0.5* (+/*/0 10w)-+/*/1 0)	{(1,0,2 # w){c14w}B('''
{(((pw)pi=ia)=w} { ( (i+i=a) > (i=alioV) ((i	((65 5 10 10 11)/'FDCRA'))	((t5) *. 0 (cC) . 0 ( s R	( A/ (9 > C) A 0 < C )	((0<+/+/(2 20901)*(p=.=m))	1 (1 2 3 4 5 6 7 8 9 0 '*'	(S-at V-(Su) > ( /c u) u o	[d=[0,5*=+/2*=w[1 2]-w[3 4	[ M-N=, N-N, 721N-cu, 1tu o 1	(A-21N-co w o (A/w) ((-A)/
(((#w)pat1) <w)< td=""><td>('FDC8A'[1+65 70 80 901w])</td><td>({ 'ABCDF'.w#1+100-w++/w</td><td>(((A/"1=1 9=1"w)/w)(cw)+(+</td><td>{(1##"w)=(*/"(10"w)=w)}s</td><td>((101++"1+10+2) '0123456789</td><td>(+(0[-[(a-#"Ew)+2)+"at"Ew)</td><td>(d-(0.5*-+/2*-w[1 2]-w[3 4] (w+.{((+/(a-w)+2)*.5)}1¢w)</td><td>(.5×1-/"u+.×0"10w}s</td><td>(((+,-)c2(#"w)/cw)</td></w)<>	('FDC8A'[1+65 70 80 901w])	({ 'ABCDF'.w#1+100-w++/w	(((A/"1=1 9=1"w)/w)(cw)+(+	{(1##"w)=(*/"(10"w)=w)}s	((101++"1+10+2) '0123456789	(+(0[-[(a-#"Ew)+2)+"at"Ew)	(d-(0.5*-+/2*-w[1 2]-w[3 4] (w+.{((+/(a-w)+2)*.5)}1¢w)	(.5×1-/"u+.×0"10w}s	(((+,-)c2(#"w)/cw)
(((pw)p1,((a-1)p0))cw)	(((1+(65 70 80 90)1w)>'FDC	(4 3 5 p k. v. 100 * ± 3 * ()	(((A/) ((res<9)A0 <res)) res<="" td=""><td>{{\\/!&lt;+/w=,=w} sw}</td><td>{ (':ADGJMPTW' L w)+ x \ n L</td><td>(a(t("1+pw)ta ([["0.5×a-a]</td><td>(+/1 14 w =. ((+/((a-w)*2))</td><td>(0.5×((p+,×1Φs)-(s+&gt; # w)+</td><td>((c(&gt; v)/w), c(&gt; -v+2 p u)/a</td></res))>	{{\\/!<+/w=,=w} sw}	{ (':ADGJMPTW' L w)+ x \ n L	(a(t("1+pw)ta ([["0.5×a-a]	(+/1 14 w =. ((+/((a-w)*2))	(0.5×((p+,×1Φs)-(s+> # w)+	((c(> v)/w), c(> -v+2 p u)/a
		(G-1(8191),ω · 'ABCDF' (α,ω		(0<+/"2*/"'su)	((10119)[2] 1w*.s'1 'ABC2	((e[0.5*(e1+"2*0*1)/1+(p"g	(+/0.5*=+/"2*=2-/(sw).11sw;	(0.5* (+/-11*/0 1em)-(*/-1	((0=2 p'n)(cu=(c''),c'
((0=a (ip,w)-1) c w) (((pw)pat1)cw)	1'FDCRA'[1+"65 70 80 901#1	R+'ABCDF', $\omega \Rightarrow \{\alpha, \{(p\omega)-1\}, \{(d+\omega), \{\alpha(-1+\beta\omega), ((+10)+10, 5+1)\}\}$	(15*((w[1]-18)*2)*.+((w[2]- (c-(cw)*.(.73+2=12.2)*.*0	((v/2*/.)"e) swj	(= /*((10*)(1***'1' '2ABC'	[tal[-1(0[a-tw)+2)datw]"cw	( ( +/1 ( w-1 \ w ) * 2 ) * 0.5 } ( +/2 { ( +/( \ a - \ w ) * 2 ) * 0.5 }/(1 * \ \ z ;	(1=00t=tru:0 = 0.5=1=/(+/=:	((40*2 p gw)(2 p ((-a)/w)
(((#w)pat1)cu)	('FDC8A'[0 65 70 80 90 1 W.	{y+#w0 ('ABCDF',w) {a,(+/w) grades-'ABCDF'++(pw){w,(1)	(att-, = , = (+, -)12 o locs-(+	(x-suov/"-11"x=10"x)	((1+'ADGJMPTV'IN) + D(WE'D	(x-sw + 1([+2+a+a] # x) + at	(+/,5==+/+2==ω-1Φω)	(2+= (+/=/(#w)+1 O++(1+#w))	((1 0,21#"w) (c1+w)8 ('''
((p,w)pa/tp,w)s,w	'FDC8A'[0 65 70 80 901w]	grades-'ABCDF'obt(pw)[w,(11	{{(([/"(9>w)*(w>0))/w}((⊆w)·	5./{(pvw) <p.w) sw<="" td=""><td>(=,/(-1+(me,(,0, ,1, ,598C</td><td>ta((-[0.5×a-(a[pw))Φap(w).</td><td>+/(+/"(w-1\psi)*2)*,5</td><td>.5*1-/+/\$(\$tw)*(1etw)</td><td>cdtn-= . /2 p wo(cdtn/w)((-c-</td></p.w)>	(=,/(-1+(me,(,0, ,1, ,598C	ta((-[0.5×a-(a[pw))Φap(w).	+/(+/"(w-1\psi)*2)*,5	.5*1-/+/\$(\$tw)*(1etw)	cdtn-= . /2 p wo(cdtn/w)((-c-
(ωε-(ρω)ρ1, (α-1)ρ0)	('FDC8A'[1+65 70 80 901w])	(('ABCDF', w) (a, (+/w), 0, 1×L)	(m/-2=x/" (=w)-m->,/ *,,-11	{(v/1<+/*.==w} sw)	(+/(19)*[2]w*.e'1' '2ABC'	(([-2+-0[α-# ω)Φτα-[αρω,(α	(+/0.5*-+/ 2*-w-1Φw)	(>>2+- (+/w×-100 w)-(+/w+14	((0 1,1-2 > p w)(=1 w)8(2p
{(1=a 1p,w cw} (wc=(#w)p1=ta)	['EDC84'[1+65 70 80 90 101]	(%t('A' 'B' 'C' 'D' 'F')(; ((α,0.1*±0*1000*(#ε)+#-1+#ε)	((((cu)*.*() 2 1)( 2 1)( .	(v/-1*1*1*1)"c	(101(wi=DA.DD)1=0 1 4 7 10	1(-0[12+====================================	(+/(+/1(((11w),11w)-w)+2)+(	(0.5= -/=(+/1+Φ=Φ")sw)	((com) = 11 (co-2) = 0 21
(wc=(fw)pati)	('FDCBA'[0 65 70 80 901w])	(w.10+21.5+1000*(+++/)w[:2]	(18 8) - (a/=1=2.1 2.31(+2)	(*/2=/.)"(.s)	(10 ~1+(≈Dd, '7@ADGJMPTW');	(![(atw)40[[2+-a-#w]".(.	(+/(+2)==+/2==u-10u):	(a b-4410 0 .5x-/a+.x-1 10)	(11"(+(cw)=21#")(1 00"'A'
(we=0*x -1+(≠w)	('FDCBA'[1+65 70 80 90 101;	(w1=[.5+1000=(+++/)w[:2]	{(w/=((9>[/)×(0<[/))"w}u++	{{\\/2*/\w,'.'}"s\w}	{"1+e(1we"'0' '1' 'ABC2' '1	{\tau,-' '/ -\q(2.pw)p(\f.	(+/(+2)**+/2***\(\overline{\pi}\) (+/(+0.5***(\overline{\pi}\))*.*2}*(2-/\overline{\pi}\) (+/**0.5)*(+/**(**2 \pi - \overline{\pi}\) (+/**(1(2-/\overline{\pi}\))**(**12-/*)	{2=≠w: 0 =  0.5=-/({+/×/x0	(0-"-((t1,0,2[p"w)(+w)80,0
(0 = + 1 ((-1 + +) + 1 + p + p + . +	((65p'F'),(5p'D'),(10p'C')	(+,0.1×[*(0.3+1000*(+++/)*	(col) = ((col 2 = ((+/el)	(x/ 1+1 = -1+1) **s	20(+/ (19) × (6"0('1234567)	to. ((-=[ 0 [ 2 += + - (p	(+/ ==0.5) (+/" (==2 ф - +)	0.500 0   0(-/) 00 0(+/) 0	. * (1*+") * (1*(+[2])) *(
((0= 110,a((1pw))cw) ((0=+1(1-+1+#+))c+)	{ FDCBA [0 65 70 80 90 101	(3-(G(\$u)) Bu o D-((8 ,[2])	(ff-{(,(w[1]-2)(w[1]+2)*.,)	(a+ su o o# +/ (a, /)	((((1001),33333434))	(tr-(1-[(a-[a[bal)+z) + (	(+/(+/ (1(2-/w) , 11)2-/:	freim lim o trefalibelibe	6.2*[(*/1)tt[:1]* 1@tt[:2
								///bank ma//ob-Tiebli/en "	(11"/1 0 214" Nov (B000 )
(((ow)o(at1))sw)	('FDCBA'T(0 65 70 80 901W)	C. WRCDF = C(F) (+) E=)(+)(#11)	ffferty-ffetter delt ) -4fe	(V)=f 1 1*.19)		1.1/(1.0)24	[[+/,0*-+,*- ][1:0]]	( [ [ 2+~+ . = = [ 1 * Q - 1 * Q ] ] / * 2 , )	(14 (1,0,21# )(CF)B999,)
{{(pu)p(at1)}cu} {!+puod=!(!+a)op=((d/a).(!-	('FDCBA'[(0 65 70 80 901w)	([PP-3 o c-5 1p'ABCDF' o x- fround-([w]+(((w-([w]))-0.	(b-18 8 o p-("2 "1)("2 1)(" (x-w[1]+("2 "2 "1 "1 1 1 2	{\v/"(((\su),"' \)={' ',"(\su {(\v''(\cu))#"(\cu)}	{ t+pw * 10 } " (+/""(w[(tt { (we'1')+(2*(we'2A8C'))+(3	(x-(tw) o y-x[::a] o r[(	((+/.5*-+.*-)(4-1*Φ)) ((+/(+/"(((1Φω)-ω)*2))*0.5) ((dist-{(+/((α-ω)*2))*0.5})	(0.5*[(+/"*/(c>"ω),ε(1Φ(2>" {me-tω*nu-Φ(me[:1],[0.5](1*	{(\ou[{="(1=2\p"\ou))/\p\ou})(\ou[ e(me[:2])))\ound=\delta(me[:1],[0.
{{(pu)p(at1)}cu} {!+puod=!(!+a)op=((d/a).(!-	('FDCBA'[(0 65 70 80 901w)	([PP-3 o c-5 1p'ABCDF' o x- fround-([w]+(((w-([w]))-0.	(b-18 8 o p-("2 "1)("2 1)(" (x-w[1]+("2 "2 "1 "1 1 1 2	{\v/"(((\su),"' \)={' ',"(\su {(\v''(\cu))#"(\cu)}	(t-pm = 10 ="1"(+/""(w[(tt	(x-(tw) o y-x[::a] o r[(	(+/(+/~(((14w)-w)*2))*0.5)	(0.5*[(+/"*/(c>"ω),ε(1Φ(2>" {me-tω*nu-Φ(me[:1],[0.5](1*	((w[(="(1=2 p"w))/\pw])(w[
{((\(\rho\)) \(\rho\)) \(\rho\) \\ \(\lho\) \(\rho\) \(\r	('FDCBA'[(0 65 70 80 90]w)) ('F' 'D' 'C' 'B' 'A')[1+(i ('FDCBAA'[0 65 70 80 90]w)] ('FDCBA'[(0 65 70 80 90 10)	(DPP-3 o c-5 ip'ABCDF' o x- (round-(([w]+(([w]-([w])-0]: (a.10+"[.5+1w3*(*-*[4*-(al)]-6")-1")-1")-1")-1")-1"]-1"-1"]-1"-1"]-1"-1"-1"-1"-1"-1"-1"-1"-1"-1"-1"-1"-1"-	(b-18 8 < p-("2" 1) ("2 1) (" (b-18 8 < p-("2" 1) ("2 1) (" (x-w[1]+("2" 2" 1 1 1 1 2 1+#w)) B'ASCDF', w:]) [:2] ÷#w ((,(cw)+(1 2) (2 1) (*,*)1	{\v',\((\su),\'\'\)={\'\'\(\su\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\	{ t+pw * 10 } " (+/""(w[(tt { (we'1')+(2*(we'2A8C'))+(3	(x-(tw) o y-x[::a] o r[(	((+/.5*-+.*-)(4-1*Φ)) ((+/(+/"(((1Φω)-ω)*2))*0.5) ((dist-{(+/((α-ω)*2))*0.5})	(0.5*[(+/"*/(c>"ω),ε(1Φ(2>" {me-tω*nu-Φ(me[:1],[0.5](1*	{(\ou[{="(1=2\p"\ou))/\p\ou})(\ou[ e(me[:2])))\ound=\delta(me[:1],[0.
{([pw)p(a:1)]ew} (!=pwod=!(!+a)op=((d/a),(!- (uc=(fw)p(=\ta) ((0=(a=!)=!+!fw)ew) (wc=(pw)p1,!+ap0)	('FDCBA'[(0 65 70 80 90]w)) ('F' 'D' 'C' 'B' 'A')[1+(i ('FDCBAA'[0 65 70 80 90]w)] ('FDCBA'[(0 65 70 80 90 10)	(  ARCD+ (  +/  +, 11   1   1   1   1   1   1   1   1   1	(b-18 8 o p-("2" 1) (" 1) (" 4 (" 4 (" 4 (" 4 (" 4 (" 4 (" 4 ("	{\v',\"(\(\s\)\"\"\)=\"\"\\"\\\\\\\\\\\\\\\\\\\\\\	{ t+pw * 10 } " (+/""(w[(tt {(we'1')+(2*(we'2A8C'))+(3	(x-(tw) o y-x[::a] o r[(	((+/.5*-+.*-)(4-1*Φ)) ((+/(+/"(((1Φω)-ω)*2))*0.5) ((dist-{(+/((α-ω)*2))*0.5})	(0.5*[(+/"*/(c>"ω),ε(1Φ(2>" {me-tω*nu-Φ(me[:1],[0.5](1*	{(\ou[{="(1=2\p"\ou))/\p\ou})(\ou[ e(me[:2])))\ound=\delta(me[:1],[0.
{(fpu)p(ati)   em) { -pu=d-((+a)p-((d/a),(t- {uc=(fu)p(=\ta)} {(0*(a*))^1+ifu)eu) {uc=(pu)p(1,i+ap0) {(0*(ati)*+ip,u)eu) {((atip,u)*+ijeu)	('FDC8A'[(0 65 70 80 90]m)) (('F' 'D' 'C' 8' 'A')[11-4' ('FDC8A*[(0 65 70 80 90]m]) ('FDC8A'[(0 65 70 80 90]m]) 'FDC8A'[0 65 70 80 90]m] 'FDC8A'[0 65 70 80 90]m] 'FDC8A'[1 + 65 70 80 90]	(astor = (+/2-)+, ill (DPP-3 o -5 )p'ASCP' o x- (round-(((w)+(((w-((w))-0.; (a.10+((a) fw) (((0.5+i) (counta-((.*#Ew)-(: 'ABCDF') (c-(3 3p((a,fw)Ew),0) o c[:	((+(-))+(-)-(-)-(-)-(-)-(-)-(-)-(-)-(-)-	{\forall \( \) \(\	{ t+pw * 10 } " (+/""(w[(tt {(we'1')+(2*(we'2A8C'))+(3	(x-(tw) - y-x[:ra] o r[( (ass-af cw - cunt-o cw - s	(\frac{(\(\frac{1}{2}\)\) \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\	(0.5-11+/'-/(c= w),E(14(2=)) (me-twomu-b(me[:1],[0.5](1=	{(\ou[{="(1=2\p"\ou))/\p\ou})(\ou[ e(me[:2])))\ound=\delta(me[:1],[0.
{\(\(\alpha\)\(\	('FDCBA'[10 65 70 80 90]w) ('F' 'D' 'C' 8' 'A')[I+(t ('FDCBA'[0 65 70 80 90]w) ('FDCBA'[10 65 70 80 90 10 ('FDCBA'[0 65 70 80 90]w) 'FDCBA'[0 65 70 80 90]w) ('FDCBA'[0 65 70 80 90]w) ('FDCBA'[0 65 70 80 90]w)	(ASCD - (+ + + - + + + + + + + + + + + + + +	((-/-(-/-12) -1) -1(-(	(\(\frac{1}{2}\) \(\frac{1}{2}\) \(\frac{1}{2}	{(+pm * 10 5";"(+/""(wE(tt {(me'1')+(2*(me'2ABC'))+(3 10)(1+ED,'::ADGJMPTY');+	(x-(tw) - y-x[:ra] o r[( (ass-af cw - cunt-o cw - s	(\frac{(\(\frac{1}{2}\)\) \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\	(0.5-11+/'-/(c= w),E(14(2=)) (me-twomu-b(me[:1],[0.5](1=	((Z f'w)(c1+w)B+)'a''
{\(\(\alpha\)\) \(\alpha\)\} \\ \{\(\-\alpha\)\} \\ \{\(\-\alpha\)\} \\ \{\(\alpha\)\} \\ \{\alpha\}\} \\ \{\(\alpha\)\} \\ \{\alpha\}\} \\ \{\(\alpha\)\} \\ \{\alpha\}\} \\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\	("FDC8A"[(0 05 70 80 90] <sub>[M</sub> )] ("F" D" "C" 8" "A")[1-4( ("FDC8A"[0 05 70 80 90] <sub>[M</sub> ]) "FDC8A"[0 05 70 80 90] <sub>[M</sub> ] "FDC8A"[0 05 70 80 90] <sub>[M</sub> ] "FDC8A"[0 05 70 80 90] <sub>[M</sub> ] "FDC8A"[0 05 70 80 90] <sub>[M</sub> ] ("FDC8A"[0 05 70 80 90] <sub>[M</sub> ]) ("FDC8A"[0 05 70 80 90] <sub>[M</sub> ])	(ASCD - (+ + + - + + + + + + + + + + + + + +	((+(-))+(-)-(-)-(-)-(-)-(-)-(-)-(-)-(-)-	(\(\frac{\partial}{\partial}\) = (' ''[sw \(\partial\) = (' ''[sw \(\partial\)] = (\partial\) = (\pa	{t+pw > 10 5 1/(+/"(wt(tt f(w:11)+(2-(w:2ABC!))+(3- 10)(14DD,'::ADGZMPTW');+ {(wtrpwle'1')+ (2-(wtrpwle	{((-!!(a-+/!(!w)[::a])[ip	(\frac{(\(\frac{1}{2}\)\) \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\	(0.5-11+/'-/(c= w),E(14(2=)) (me-twomu-b(me[:1],[0.5](1=	((Z f'w)(c1+w)B+)'a''
{{(cu)p(at1)}cw} {{(-au)p(at1)}cw} {{(-au)p(a(-a)p(-a)p(-a)p(-a)p(-a)p(-a)p(-a)p(	(*FOSA*[(0 o5 70 80 90] <sub>10</sub> )) (*f* 'D* 'C' '8' *A)[[1+(e) (*fOSA*[(0 o5 70 80 90] <sub>10</sub> )] (*FOSA*[(0 o5 70 80 90] <sub>10</sub> )] (*FOSA*[(0 o5 70 80 90] <sub>10</sub> ]) (*FOSA*[(0 o5 70 80 90] <sub>10</sub> ]) (*FOSA*[(0 o5 70 80 90] <sub>10</sub> )] (*FOSA*[(0 o5 70 80 90] <sub>10</sub> )) (*[((65 70 80 90 101)] <sub>10</sub> )*=(*FOSA*[(0 o5 70 80 90] <sub>10</sub> ))	(PPP-3 or -5 1p/A8C07 or -	((x, (x), (x) = 1) = 1) = 1(x = 1	(\(\frac{\partial}{\partial}\) = (' ''[sw \(\partial\) = (' ''[sw \(\partial\)] = (\partial\) = (\pa	{(+pm * 10 5";"(+/""(wE(tt {(me'1')+(2*(me'2ABC'))+(3 10)(1+ED,'::ADGJMPTY');+	{((-!!(a-+/!(!w)[::a])[ip	(\frac{(\frac{1}{2}\)}{\frac{1}{2}\} \frac{(\frac{1}{2}\)}{\frac{1}{2}\} \frac{(\frac{1}{2}\)}{\frac{1}{2}\} \frac{(\frac{1}{2}\)}{\frac{1}{2}\} \frac{(\frac{1}{2}\)}{\frac{1}{2}\} \frac{(\frac{1}{2}\)}{\frac{1}{2}\} \frac{(\frac{1}{2}\)}{\frac{1}{2}\} \frac{1}{2}\} \frac{(\frac{1}{2}\)}{\frac{1}{2}\} \frac{(\frac{1}{2}\)}{\frac{1}{2}\} \frac{1}{2}\} \frac{1}{2}\} \frac{(\frac{1}{2}\)}{\frac{1}{2}\} \frac{1}{2}\} \frac{1}{2}	(0.5-11+/'-/(c= w),E(14(2=)) (me-twomu-b(me[:1],[0.5](1=	((Z f'w)(c1+w)B+)'a''
{{(cw)p(at1)cw}}{{(!-pw)^{-}([(a)p)^{-}([d/a),[1-(w-1)^{-}([d/a),[1-(w-1)^{-}([d/a),[1-(w-1)^{-}([d/a),[1-(w-1)^{-}([d/a),[1-(w-1)^{-}([d/a),[1-(w-1)^{-}([d/a),[1-(w-1)^{-}([d/a),[1-(w-1)^{-}([d/a),[1-([u/a),[1-([u/a	(*FOCEA**[0 05 70 80 90]ab* (*F* 70 *C 8* A)[1+4* (*FOCEA**[0 05 70 80 90]ab* (*FOCEA**[0 05 70 80 90]ab*) (*FOCEA**[0 05 70 80 90]ab*)	(ABOUT - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 -	((-/-(-/-12) -1) -1(-(	(\(\frac{\partial}{\partial}\) = (' ''[sw \(\partial\) = (' ''[sw \(\partial\)] = (\partial\) = (\pa	{t+pw > 10 5 1/(+/"(wt(tt f(w:11)+(2-(w:2ABC!))+(3- 10)(14DD,'::ADGZMPTW');+ {(wtrpwle'1')+ (2-(wtrpwle	{((-!!(a-+/!(!w)[::a])[ip	(\frac{(\frac{1}{2}\)}{\frac{1}{2}\} \frac{(\frac{1}{2}\)}{\frac{1}{2}\} \frac{(\frac{1}{2}\)}{\frac{1}{2}\} \frac{(\frac{1}{2}\)}{\frac{1}{2}\} \frac{(\frac{1}{2}\)}{\frac{1}{2}\} \frac{(\frac{1}{2}\)}{\frac{1}{2}\} \frac{(\frac{1}{2}\)}{\frac{1}{2}\} \frac{1}{2}\} \frac{(\frac{1}{2}\)}{\frac{1}{2}\} \frac{(\frac{1}{2}\)}{\frac{1}{2}\} \frac{1}{2}\} \frac{1}{2}\} \frac{(\frac{1}{2}\)}{\frac{1}{2}\} \frac{1}{2}\} \frac{1}{2}	(0.5-11+/'-/(c= w),E(14(2=)) (me-twomu-b(me[:1],[0.5](1=	((Z f'w)(c1+w)B+)'a''
{{(cw)p(at)}cw} {{(-pw)d((tw)p(-(d/a),(t-(wc)(d/a),(t-(wc)(d/a),(t-(wc)(d/a)),(t-(wc)(	(*FOCEA*[(0 05 70 80 90]ab) (*F* 'D' 'C' 'B' 'A)[[1+( (*FOCEAA*](0 05 70 80 90]ab] (*FOCEA*[(0 05 70 80 90]ab]	(ABOUT - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 -	((	(\(\frac{\partial}{\partial}\) = (' ''[sw \(\partial\) = (' ''[sw \(\partial\)] = (\partial\) = (\pa	{t+pw > 10 5 1/(+/"(wt(tt f(w:11)+(2-(w:2ABC!))+(3- 10)(14DD,'::ADGZMPTW');+ {(wtrpwle'1')+ (2-(wtrpwle	{((-!!(a-+/!(!w)[::a])[ip	(\$4',53'-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1	(0.5-11+/'-/(c= w),E(14(2=)) (me-twomu-b(me[:1],[0.5](1=	((Z f'w)(c1+w)B+)'a''
{{(cw)p(at1)cw}}{t(-w)p(-(d/a),(t-(w-c)(d/a)	(*FCCSA*[0 05 70 80 90]ab; (*F* 'D' 'C' 'B' 'A)[1+(* (*FCCSA*[0 05 70 80 90]ab] (*FCCSA*[0 05 70 80 90]ab]	(ABOUT - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 -	((	(\(\frac{1}{\sigma}\) = (' ''[sw \(\frac{1}{\sigma}\)] = (' ''[sw \(\frac{1}{\sigma}\]) = (' -1k1)] = \(\frac{1}{\sigma}\) = (\frac{1}{\sigma}\) = (	{t+pw > 10 5 1/(+/"(wt(tt f(w:11)+(2-(w:2ABC!))+(3- 10)(14DD,'::ADGZMPTW');+ {(wtrpwle'1')+ (2-(wtrpwle	{((-!!(a-+/!(!w)[::a])[ip	(\$4',53'-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1	(0.5-11+/'-/(c= w),E(14(2=)) (me-twomu-b(me[:1],[0.5](1=	((Z f'w)(c1+w)B+)'a''
{{(cw)p(at1)cw}}{(t-pw)de((t-a)per((d/a),(t-(w-c)fw)por((d/a),(t-(w-c)fw)por((d/a),(t-(w-c)fw)por((d/a),(t-(w-c)fw)por((d/a)))cw}{((w-c)fw)por((d/a),(t-(w-c	(*FOCEA*[(0 05 70 80 90]ab) (*F', D', C', B', A)[[1+(4 (*FOCEAA*[0 05 70 80 90]ab]) (*FOCEA*[0 05 70 80 90]ab]	(ABOUT - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 -	((	(\(\frac{1}{\sigma}\) = (' ''[sw \(\frac{1}{\sigma}\)] = (' ''[sw \(\frac{1}{\sigma}\]) = (' -1k1)] = \(\frac{1}{\sigma}\) = (\frac{1}{\sigma}\) = (	{t+pw > 10 5 1/(+/"(wt(tt f(w:11)+(2-(w:2ABC!))+(3- 10)(14DD,'::ADGZMPTW');+ {(wtrpwle'1')+ (2-(wtrpwle	{((-!!(a-+/!(!w)[::a])[ip	(\$4',53'-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1	(0.5-11+/'-/(c= w),E(14(2=)) (me-twomu-b(me[:1],[0.5](1=	((Z f'w)(c1+w)B+)'a''
{{(cw)p(at1)cw}} {{t-puyde([ta]pp-(dya),(t-tw-cp-(d	(*FOCEA*[(0 05 70 80 90]_w) (*F' D' 0 8' A)[[1+( *FOCEA*[0 05 70 80 90]_w] (*FOCEA*[0 05 70 80 90]_w]	(ASOUT - 1 1 1/2 14-141)  ((BPP-3 - C-1 1/4 NCDT - 0 x  (Fround-([]w]) + (([]w]) + (([]w]) + (([]w]) + (([]w]) + ([]w]) + ([]w	((	(\(\frac{1}{\sigma}\) = (' ''[sw \(\frac{1}{\sigma}\)] = (' ''[sw \(\frac{1}{\sigma}\]) = (' -1k1)] = \(\frac{1}{\sigma}\) = (\frac{1}{\sigma}\) = (	{t+pw > 10 5 1/(+/"(wt(tt f(w:11)+(2-(w:2ABC!))+(3- 10)(14DD,'::ADGZMPTW');+ {(wtrpwle'1')+ (2-(wtrpwle	{((-!!(a-+/!(!w)[::a])[ip	(\$4',53'-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1	(0.5-11+/'-/(c= w),E(14(2=)) (me-twomu-b(me[:1],[0.5](1=	((Z f'w)(c1+w)B+)'a''
{{(au)p(at1)eu} {{t-pudd((ta)pp((d/a),{t-} {uc^2(pa)p(th(a))} {uc^2(pa)p(th(a))} {uc^2(pa)p(th(a))} {uc^2(pa)p(th(a)) {uc^2(pa)p(th(a)) {(ta(tu)pul)eu} {(ta(tu)pul)eu} {(ta(tu)pul)eu} {(tpu)p(th(a-1)/0)eu} {(tpu)p(th(a-1)/0)eu} {(tpu)p(th(a-1)/0)eu} {(tpu)p(th(a-1)/0)eu} {(tpu)p(th(a-1)/0)eu} {(tpu)p(th(a-1)/0)eu} {(tpu)p(th(a-1)/0)eu} {(tpu)p(th(a-1)/0)eu} {(tpu)p(th(a-1)/0)eu} {(tpu)p(th(a-1)/0)eu} {(tpu)p(th(a-1)/0)eu} {(tpu)p(th(a)eu)eu}	(*FOCEA*[(0 05 70 80 90]_w) (*F' D' 0 8' A)[[1+( *FOCEA*[0 05 70 80 90]_w] (*FOCEA*[0 05 70 80 90]_w]	(PPP-3 or 5:19/ABCD7 or 4 (Founder([]w]=([]w)=([]w]=([]w)=([]w]=([]w]=([]w]=([]w)=([]w]=([]w]=([]w)=([]w]=([]w)=([]w]=([]w)=([]w]=([]w)=([]w]=([]w)=([	(((-/	(\(\frac{1}{\sigma}\) = (' ''[sw \(\frac{1}{\sigma}\)] = (' ''[sw \(\frac{1}{\sigma}\]) = (' -1k1)] = \(\frac{1}{\sigma}\) = (\frac{1}{\sigma}\) = (	{t-pw 0 10 s"1"{+/""(wtf(st f(wt'st')+{2*c(ox*2ABC')})+(3 10)(i4 D), "sABG2PHTV")}+ (tutrpw]e'1")+ (2*(wtrpw]e f(0 1 2 3 4 5 0 7 8 9, 3 3	((-(L((a-+/((tw)[))a)))tp	(**/((((1="w)-1+((1="w)   (1+(-)")((1(1+(1+(1+(1+(1+(1+(1+(1+(1+(1+(1+(1+(	(0.5-11+/'-/(c= w),E(14(2= (me-twomu-\(me[:1],[0.5](1=	((Z f'w)(c1+w)B+)'a''
(([ap)[at:1])cu) (([apa][at:[a]]ap=([d/a],([t-ta])ap=([d/a],([t-ta])ap=([d/a],([t-ta])ap=([d/a],([t-ta])ap=([t	(*FOCEA*[(0 05 70 80 90]_w) (*F' D' 0 8' A)[[1+( *FOCEA*[0 05 70 80 90]_w] (*FOCEA*[0 05 70 80 90]_w]	(ASOUT - 1 1 1/2 14-141)  ((BPP-3 - C-1 1/4 NCDT - 0 x  (Fround-([]w]) + (([]w]) + (([]w]) + (([]w]) + (([]w]) + ([]w]) + ([]w	(((-/	(\(\frac{1}{\sigma}\) = (' ''[sw \(\frac{1}{\sigma}\)] = (' ''[sw \(\frac{1}{\sigma}\]) = (' -1k1)] = \(\frac{1}{\sigma}\) = (\frac{1}{\sigma}\) = (	{t-pw 0 10 s"1"{+/""(wtf(st f(wt'st')+{2*c(ox*2ABC')})+(3 10)(i4 D), "sABG2PHTV")}+ (tutrpw]e'1")+ (2*(wtrpw]e f(0 1 2 3 4 5 0 7 8 9, 3 3	{((-!!(a-+/!(!w)[::a])[ip	(**/((((1="w)-1+((1="w)   (1+(-)")((1(1+(1+(1+(1+(1+(1+(1+(1+(1+(1+(1+(1+(	(0.5-11+/'-/(c= w),E(14(2= (me-twomu-\(me[:1],[0.5](1=	((Z f'w)(c1+w)B+)'a''
{{([a) a(1) eu}} {([a-a] a(1) eu}, {(a-a) a(1) a(1) a(1) a(1) a(1) a(1) a(1) a(	(*FOCEA*[(0 05 70 80 90]_w) (*F' D' 0 8' A)[[1+( *FOCEA*[0 05 70 80 90]_w] (*FOCEA*[0 05 70 80 90]_w]	(PPP-3 or 5:19/ABCD7 or 4 (Founder([]w]=([]w)=([]w]=([]w)=([]w]=([]w]=([]w]=([]w)=([]w]=([]w]=([]w)=([]w]=([]w)=([]w]=([]w)=([]w]=([]w)=([]w]=([]w)=([	(((-/	(\(\frac{1}{\sigma}\) = (' ''[sw \(\frac{1}{\sigma}\)] = (' ''[sw \(\frac{1}{\sigma}\]) = (' -1k1)] = \(\frac{1}{\sigma}\) = (\frac{1}{\sigma}\) = (	{t-pw 0 10 s"1"{+/""(wtf(st f(wt'st')+{2*c(ox*2ABC')})+(3 10)(i4 D), "sABG2PHTV")}+ (tutrpw]e'1")+ (2*(wtrpw]e f(0 1 2 3 4 5 0 7 8 9, 3 3	((-(L((a-+/((tw)[))a)))tp	(**/((((1="w)-1+((1="w)   (1+(-)")((1(1+(1+(1+(1+(1+(1+(1+(1+(1+(1+(1+(1+(	(0.5-11+/'-/(c= w),E(14(2= (me-twomu-\(me[:1],[0.5](1=	((Z f'w)(c1+w)B+)'a''
{{[(p_u)[a(x1)]eu}} {(m-u)[a(x1)[a][a(x1)[a](1) {m-u}[a][a(x1)[a](1) {m-u}[a][a(x1)[a](1) {m-u}[a][a(x1)[a](1) {(m-u)[a](1)[a](1) {(m-u)[a](1)[a](1)[a](1) {(m-u)[a](1	(*FOCEA*[(0 05 70 80 90]_w) (*F' D' 0 8' A)[[1+( *FOCEA*[0 05 70 80 90]_w] (*FOCEA*[0 05 70 80 90]_w]	(PPP-3 or 5:19/ABCD7 or 4 (Founder([]w]=([]w)=([]w]=([]w)=([]w]=([]w]=([]w]=([]w)=([]w]=([]w]=([]w)=([]w]=([]w)=([]w]=([]w)=([]w]=([]w)=([]w]=([]w)=([	(((-/	(\(\sigma_{1} \) \(\sigma_{1}	{t-pw 0 10 s"1"{+/""(wtf(st f(wt'st')+{2*c(ox*2ABC')})+(3 10)(i4 D), "sABG2PHTV")}+ (tutrpw]e'1")+ (2*(wtrpw]e f(0 1 2 3 4 5 0 7 8 9, 3 3	((-(L((a-+/((tw)[))a)))tp	(**/((((1="w)-1+((1="w)   (1+(-)")((1(1+(1+(1+(1+(1+(1+(1+(1+(1+(1+(1+(1+(	(0.5-11+/'-/(c= w),E(14(2= (me-twomu-\(me[:1],[0.5](1=	((Z f'w)(c1+w)B+)'a''
{{([a])p(at1)}ew} {([a])p(at1)}ew{{([d/a),([t-t])p(at1)}ew} {[a](b](at1)]p(at1)ew} {[a](b](at1)[at1)ew} {[a](at1)[at1)ew} {([a](at1)[at1)ew} {([a](at1)[at1)ew} {([a](at1)[at1)ew} {([a](at1)[at1)ew} {([a](at1)[at1)ew} {([a](at1)[at1)ew} {([a](at1)[at1)ew} {([a](at1)[at1)ew} {([a](at1)[at1)ew} {([a](at1)[at1)ew} {([a](at1)[at1)ew} {([a](at1)[at1)ew} {([a](at1)[at1)ew} {([a](at1)[at1)[at1)ew} {([a](at1)[at1)[at1)[at1)ew} {(([a](at1)[at1)[at1)[at1)[at1][at1][at1][at1][at1][at1][at1][at1]	(*FOCEA*[(0 05 70 80 90]_w) (*F' D' 0 8' A)[[1+( *FOCEA*[0 05 70 80 90]_w] (*FOCEA*[0 05 70 80 90]_w]	(PPP-3 or 5:19/ABCD7 or 4 (Founder([]w]=([]w)=([]w]=([]w)=([]w]=([]w]=([]w]=([]w)=([]w]=([]w]=([]w)=([]w]=([]w)=([]w]=([]w)=([]w]=([]w)=([]w]=([]w)=([	(((-/	(\(\sigma_{1} \) \(\sigma_{1}	{t-pw 0 10 s"1"{+/""(wtf(st f(wt'st')+{2*c(ox*2ABC')})+(3 10)(i4 D), "sABG2PHTV")}+ (tutrpw]e'1")+ (2*(wtrpw]e f(0 1 2 3 4 5 0 7 8 9, 3 3	((-(L((a-+/((tw)[))a)))tp	(**/((((1="w)-1+((1="w)   (1+(-)")((1(1+(1+(1+(1+(1+(1+(1+(1+(1+(1+(1+(1+(	(0.5-11+/'-/(c= w),E(14(2= (me-twomu-\(me[:1],[0.5](1=	((Z f'w)(c1+w)B+)'a''
{{([a])p(at1)}ew} {([a])p(at1)}ew{{([d/a),([t-t])p(at1)}ew} {[a](b](at1)]p(at1)ew} {[a](b](at1)[at1)ew} {[a](at1)[at1)ew} {([a](at1)[at1)ew} {([a](at1)[at1)ew} {([a](at1)[at1)ew} {([a](at1)[at1)ew} {([a](at1)[at1)ew} {([a](at1)[at1)ew} {([a](at1)[at1)ew} {([a](at1)[at1)ew} {([a](at1)[at1)ew} {([a](at1)[at1)ew} {([a](at1)[at1)ew} {([a](at1)[at1)ew} {([a](at1)[at1)ew} {([a](at1)[at1)[at1)ew} {([a](at1)[at1)[at1)[at1)ew} {(([a](at1)[at1)[at1)[at1)[at1][at1][at1][at1][at1][at1][at1][at1]	(*FOCEA*[(0 05 70 80 90]_w) (*F' D' 0 8' A)[[1+( *FOCEA*[0 05 70 80 90]_w] (*FOCEA*[0 05 70 80 90]_w]	(PPP-3 or 5:19/ABCD7 or 4 (Founder([]w]=([]w)=([]w]=([]w)=([]w]=([]w]=([]w]=([]w)=([]w]=([]w]=([]w)=([]w]=([]w)=([]w]=([]w)=([]w]=([]w)=([]w]=([]w)=([	(((-/	(\(\sigma_{1} \) \(\sigma_{1}	{t-pw 0 10 s"1"{+/""(wtf(st f(wt'st')+{2*c(ox*2ABC')})+(3 10)(i4 D), "sABG2PHTV")}+ (tutrpw]e'1")+ (2*(wtrpw]e f(0 1 2 3 4 5 0 7 8 9, 3 3	((-(L((a-+/((tw)[))a)))tp	(**/((((1="w)-1+((1="w)   (1+(-)")((1(1+(1+(1+(1+(1+(1+(1+(1+(1+(1+(1+(1+(	(0.5-11+/'-/(c= w),E(14(2= (me-twomu-\(me[:1],[0.5](1=	((Z f'w)(c1+w)B+)'a''
{{([a])p(at1)}ew} {([a])p(at1)}ew{{([d/a),([t-t])p(at1)}ew} {[a](b](at1)]p(at1)ew} {[a](b](at1)[at1)ew} {[a](at1)[at1)ew} {([a](at1)[at1)ew} {([a](at1)[at1)ew} {([a](at1)[at1)ew} {([a](at1)[at1)ew} {([a](at1)[at1)ew} {([a](at1)[at1)ew} {([a](at1)[at1)ew} {([a](at1)[at1)ew} {([a](at1)[at1)ew} {([a](at1)[at1)ew} {([a](at1)[at1)ew} {([a](at1)[at1)ew} {([a](at1)[at1)ew} {([a](at1)[at1)[at1)ew} {([a](at1)[at1)[at1)[at1)ew} {(([a](at1)[at1)[at1)[at1)[at1][at1][at1][at1][at1][at1][at1][at1]	(*FOCEA*[(0 05 70 80 90]_w) (*F' D' 0 8' A)[[1+( *FOCEA*[0 05 70 80 90]_w] (*FOCEA*[0 05 70 80 90]_w]	(PPP-3 or 5:19/ABCD7 or 4 (Founder([]w]=([]w)=([]w]=([]w)=([]w]=([]w]=([]w]=([]w)=([]w]=([]w]=([]w)=([]w]=([]w)=([]w]=([]w)=([]w]=([]w)=([]w]=([]w)=([	(((-/	(\(\sigma_{1} \) \(\sigma_{1}	{t-pw 0 10 s"1"{+/""(wtf(st f(wt'st')+{2*c(ox*2ABC')})+(3 10)(i4 D), "sABG2PHTV")}+ (tutrpw]e'1")+ (2*(wtrpw]e f(0 1 2 3 4 5 0 7 8 9, 3 3	((-(L((a-+/((tw)[))a)))tp	(**/((((1="w)-1+((1="w)   (1+(-)")((1(1+(1+(1+(1+(1+(1+(1+(1+(1+(1+(1+(1+(	(0.5-11+/'-/(c= w),E(14(2= (me-twomu-\(me[:1],[0.5](1=	((Z f'w)(c1+w)B+)'a''
{{([a])p(at1)}ew} {([a])p(at1)}ew{{([d/a),([t-t])p(at1)}ew} {[a](b](at1)]p(at1)ew} {[a](b](at1)[at1)ew} {[a](at1)[at1)ew} {([a](at1)[at1)ew} {([a](at1)[at1)ew} {([a](at1)[at1)ew} {([a](at1)[at1)ew} {([a](at1)[at1)ew} {([a](at1)[at1)ew} {([a](at1)[at1)ew} {([a](at1)[at1)ew} {([a](at1)[at1)ew} {([a](at1)[at1)ew} {([a](at1)[at1)ew} {([a](at1)[at1)ew} {([a](at1)[at1)ew} {([a](at1)[at1)[at1)ew} {([a](at1)[at1)[at1)[at1)ew} {(([a](at1)[at1)[at1)[at1)[at1][at1][at1][at1][at1][at1][at1][at1]	(*FOCEA*[(0 05 70 80 90]_w) (*F' D' 0 8' A)[[1+( *FOCEA*[0 05 70 80 90]_w] (*FOCEA*[0 05 70 80 90]_w]	(PPP-3 or 5:19/ABCD7 or 4 (Founder([]w]=([]w)=([]w]=([]w)=([]w]=([]w]=([]w]=([]w)=([]w]=([]w]=([]w)=([]w]=([]w)=([]w]=([]w)=([]w]=([]w)=([]w]=([]w)=([	(((-/	(\(\sigma_{1} \) \(\sigma_{1}	{t-pw 0 10 s"1"{+/""(wtf(st f(wt'st')+{2*c(ox*2ABC')})+(3 10)(i4 D), "sABG2PHTV")}+ (tutrpw]e'1")+ (2*(wtrpw]e f(0 1 2 3 4 5 0 7 8 9, 3 3	((-(L((a-+/((tw)[))a)))tp	(**/((((1="w)-1+((1="w)   (1+(-)")((1(1+(1+(1+(1+(1+(1+(1+(1+(1+(1+(1+(1+(	(0.5-11+/'-/(c= w),E(14(2= (me-twomu-\(me[:1],[0.5](1=	((Z f'w)(c1+w)B+)'a''
{{([a])p(at1)}ew} {([a])p(at1)}ew{{([d/a),([t-t])p(at1)}ew} {[a](b](at1)]p(at1)ew} {[a](b](at1)[at1)ew} {[a](at1)[at1)ew} {([a](at1)[at1)ew} {([a](at1)[at1)ew} {([a](at1)[at1)ew} {([a](at1)[at1)ew} {([a](at1)[at1)ew} {([a](at1)[at1)ew} {([a](at1)[at1)ew} {([a](at1)[at1)ew} {([a](at1)[at1)ew} {([a](at1)[at1)ew} {([a](at1)[at1)ew} {([a](at1)[at1)ew} {([a](at1)[at1)ew} {([a](at1)[at1)[at1)ew} {([a](at1)[at1)[at1)[at1)ew} {(([a](at1)[at1)[at1)[at1)[at1][at1][at1][at1][at1][at1][at1][at1]	(*FOCEA*[(0 05 70 80 90]_w) (*F' D' 0 8' A)[[1+( *FOCEA*[0 05 70 80 90]_w] (*FOCEA*[0 05 70 80 90]_w]	(PPP-3 or 5:19/ABCD7 or 4 (Founder([]w]=([]w)=([]w]=([]w)=([]w]=([]w]=([]w]=([]w)=([]w]=([]w]=([]w)=([]w]=([]w)=([]w]=([]w)=([]w]=([]w)=([]w]=([]w)=([	(((-/	(\(\sigma_{1} \) \(\sigma_{1}	{t-pw 0 10 s"1"{+/""(wtf(st f(wt'st')+{2*c(ox*2ABC')})+(3 10)(i4 D), "sABG2PHTV")}+ (tutrpw]e'1")+ (2*(wtrpw]e f(0 1 2 3 4 5 0 7 8 9, 3 3	((-(L((a-+/((tw)[))a)))tp	(**/((((1="w)-1+((1="w)   (1+(-)")((1(1+(1+(1+(1+(1+(1+(1+(1+(1+(1+(1+(1+(	(0.5-11+/'-/(c= w),E(14(2= (me-twomu-\(me[:1],[0.5](1=	((Z f'w)(c1+w)B+)'a''
{{([a])p(at1)}ew} {([a])p(at1)}ew{{([d/a),([t-t])p(at1)}ew} {[a](b](at1)]p(at1)ew} {[a](b](at1)[at1)ew} {[a](at1)[at1)ew} {([a](at1)[at1)ew} {([a](at1)[at1)ew} {([a](at1)[at1)ew} {([a](at1)[at1)ew} {([a](at1)[at1)ew} {([a](at1)[at1)ew} {([a](at1)[at1)ew} {([a](at1)[at1)ew} {([a](at1)[at1)ew} {([a](at1)[at1)ew} {([a](at1)[at1)ew} {([a](at1)[at1)ew} {([a](at1)[at1)ew} {([a](at1)[at1)[at1)ew} {([a](at1)[at1)[at1)[at1)ew} {(([a](at1)[at1)[at1)[at1)[at1][at1][at1][at1][at1][at1][at1][at1]	(*FOCEA*[(0 05 70 80 90]_w) (*F' D' 0 8' A)[[1+( *FOCEA*[0 05 70 80 90]_w] (*FOCEA*[0 05 70 80 90]_w]	(PPP-3 or 5:19/ABCD7 or 4 (Founder([]w]=([]w)=([]w]=([]w)=([]w]=([]w]=([]w]=([]w)=([]w]=([]w]=([]w)=([]w]=([]w)=([]w]=([]w)=([]w]=([]w)=([]w]=([]w)=([	(((-/	(\(\sigma_{1} \) \(\sigma_{1}	{t-pw 0 10 s"1"{+/""(wtf(st f(wt'st')+{2*c(ox*2ABC')})+(3 10)(i4 D), "sABG2PHTV")}+ (tutrpw]e'1")+ (2*(wtrpw]e f(0 1 2 3 4 5 0 7 8 9, 3 3	((-(L((a-+/((tw)[))a)))tp	(**/((((1="w)-1+((1="w)   (1+(-)")((1(1+(1+(1+(1+(1+(1+(1+(1+(1+(1+(1+(1+(	(0.5-11+/'-/(c= w),E(14(2= (me-twomu-\(me[:1],[0.5](1=	((Z f'w)(c1+w)B+)'a''
{{([a])p(at1)}ew} {([a])p(at1)}ew{{([d/a),([t-t])p(at1)}ew} {[a](b](at1)]p(at1)ew} {[a](b](at1)[at1)ew} {[a](at1)[at1)ew} {([a](at1)[at1)ew} {([a](at1)[at1)ew} {([a](at1)[at1)ew} {([a](at1)[at1)ew} {([a](at1)[at1)ew} {([a](at1)[at1)ew} {([a](at1)[at1)ew} {([a](at1)[at1)ew} {([a](at1)[at1)ew} {([a](at1)[at1)ew} {([a](at1)[at1)ew} {([a](at1)[at1)ew} {([a](at1)[at1)ew} {([a](at1)[at1)[at1)ew} {([a](at1)[at1)[at1)[at1)ew} {(([a](at1)[at1)[at1)[at1)[at1][at1][at1][at1][at1][at1][at1][at1]	(*FOCEA*[(0 05 70 80 90]_w) (*F' D' 0 8' A)[[1+( *FOCEA*[0 05 70 80 90]_w] (*FOCEA*[0 05 70 80 90]_w]	(PPP-3 or 5:19/ABCD7 or 4 (Founder([]w]=([]w)=([]w]=([]w)=([]w]=([]w]=([]w]=([]w)=([]w]=([]w]=([]w)=([]w]=([]w)=([]w]=([]w)=([]w]=([]w)=([]w]=([]w)=([	(((-/	(\(\sigma_{1} \) \(\sigma_{1}	{t-pw 0 10 s"1"{+/""(wtf(st f(wt'st')+{2*c(ox*2ABC')})+(3 10)(i4 D), "sABG2PHTV")}+ (tutrpw]e'1")+ (2*(wtrpw]e f(0 1 2 3 4 5 0 7 8 9, 3 3	((-(L((a-+/((tw)[))a)))tp	(**/((((1="w)-1+((1="w)   (1+(-)")((1(1+(1+(1+(1+(1+(1+(1+(1+(1+(1+(1+(1+(	(0.5-11+/'-/(c= w),E(14(2= (me-twomu-\(me[:1],[0.5](1=	((Z f'w)(c1+w)B+)'a''
{{([a])p(at1)}ew} {([a])p(at1)}ew{{([d/a),([t-t])p(at1)}ew} {[a](b](at1)]p(at1)ew} {[a](b](at1)[at1)ew} {[a](at1)[at1)ew} {([a](at1)[at1)ew} {([a](at1)[at1)ew} {([a](at1)[at1)ew} {([a](at1)[at1)ew} {([a](at1)[at1)ew} {([a](at1)[at1)ew} {([a](at1)[at1)ew} {([a](at1)[at1)ew} {([a](at1)[at1)ew} {([a](at1)[at1)ew} {([a](at1)[at1)ew} {([a](at1)[at1)ew} {([a](at1)[at1)ew} {([a](at1)[at1)[at1)ew} {([a](at1)[at1)[at1)[at1)ew} {(([a](at1)[at1)[at1)[at1)[at1][at1][at1][at1][at1][at1][at1][at1]	(*FOCEA*[(0 05 70 80 90]_w) (*F' D' 0 8' A)[[1+( *FOCEA*[0 05 70 80 90]_w] (*FOCEA*[0 05 70 80 90]_w]	(PPP-3 or 5:19/ABCD7 or 4 (Founder([]w]=([]w)=([]w]=([]w)=([]w]=([]w]=([]w]=([]w)=([]w]=([]w]=([]w)=([]w]=([]w)=([]w]=([]w)=([]w]=([]w)=([]w]=([]w)=([	(((-/	(\(\sigma_{1} \) \(\sigma_{1}	{t-pw 0 10 s"1"{+/""(wtf(st f(wt'st')+{2*c(ox*2ABC')})+(3 10)(i4 D), "sABG2PHTV")}+ (tutrpw]e'1")+ (2*(wtrpw]e f(0 1 2 3 4 5 0 7 8 9, 3 3	((-(L((a-+/((tw)[))a)))tp	(**/((((1="w)-1+((1="w)   (1+(-)")((1(1+(1+(1+(1+(1+(1+(1+(1+(1+(1+(1+(1+(	(0.5-11+/'-/(c= w),E(14(2= (me-twomu-\(me[:1],[0.5](1=	((2 f'w)(c1+w)B-)'s'
{{[(p_u)[a(x1)]eu}} {(m-u)[a(x1)[a][a(x1)[a](1) {m-u}[a][a(x1)[a](1) {m-u}[a][a(x1)[a](1) {m-u}[a][a(x1)[a](1) {(m-u)[a](1)[a](1) {(m-u)[a](1)[a](1)[a](1) {(m-u)[a](1	(*FOCEA*[(0 05 70 80 90]_w) (*F' D' 0 8' A)[[1+( *FOCEA*[0 05 70 80 90]_w] (*FOCEA*[0 05 70 80 90]_w]	(PPP-3 or 5:19/ABCD7 or 4 (Founder([]w]=([]w)=([]w]=([]w)=([]w]=([]w]=([]w]=([]w)=([]w]=([]w]=([]w)=([]w]=([]w)=([]w]=([]w)=([]w]=([]w)=([]w]=([]w)=([	(((-/	(\(\sigma_{1} \) \(\sigma_{1}	{t-pw 0 10 s"1"{+/""(wtf(st f(wt'st')+{2*c(ox*2ABC')})+(3 10)(i4 D), "sABG2PHTV")}+ (tutrpw]e'1")+ (2*(wtrpw]e f(0 1 2 3 4 5 0 7 8 9, 3 3	((-(L((a-+/((tw)[))a)))tp	(**/((((1="w)-1+((1="w)   (1+(-)")((1(1+(1+(1+(1+(1+(1+(1+(1+(1+(1+(1+(1+(	(0.5-11+/'-/(c= w),E(14(2= (me-twomu-\(me[:1],[0.5](1=	((Z f'w)(cliw)B-)'s''.
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(([cu))(a:1)(a) (([cu])(a)(1)(a)(1) ([cu]([u])(a)(a)(1)(a)(a)(a)(a)(a)(a)(a)(a)(a)(a)(a)(a)(a)	(*FOCEA*[(0 05 70 80 90]_w) (*F' D' 0 8' A)[[1+( *FOCEA*[0 05 70 80 90]_w] (*FOCEA*[0 05 70 80 90]_w]	(PPP-3 or 5:19/ABCD7 or 4 (Founder([]w]=([]w)=([]w]=([]w)=([]w]=([]w]=([]w]=([]w)=([]w]=([]w]=([]w)=([]w]=([]w)=([]w]=([]w)=([]w]=([]w)=([]w]=([]w)=([	(((-/	(\(\sigma_{1} \) \(\sigma_{1}	{t-pw 0 10 s"1"{+/""(wtf(st f(wt'st')+f2e(out'2ABC'))+f3 10 (f4ED, 's:ABG2MPTV')]+ (twtxpw]e'1')+ (2*(wtxpw]e f(0 1 2 3 4 5 0 7 8 9, 3 3	((-(L((a-+/((tw)[))a)))tp	(**/((((1="w)-1+((1="w)   (1+(-)")((1(1+(1+(1+(1+(1+(1+(1+(1+(1+(1+(1+(1+(	(0.5-11+/'-/(c= w),E(14(2= (me-twomu-\(me[:1],[0.5](1=	((2 f'w)(c1+w)B-)'s'
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(([cu))(a:1)(a) (([cu])(a)(1)(a)(1) ([cu]([u])(a)(a)(1)(a)(a)(a)(a)(a)(a)(a)(a)(a)(a)(a)(a)(a)	(*FOCEA*[(0 05 70 80 90]_w) (*F' D' 0 8' A)[[1+( *FOCEA*[0 05 70 80 90]_w] (*FOCEA*[0 05 70 80 90]_w]	(PPP-3 or 5:19/ABCD7 or 4 (Founder([]w]=([]w)=([]w]=([]w)=([]w]=([]w]=([]w]=([]w)=([]w]=([]w]=([]w)=([]w]=([]w)=([]w]=([]w)=([]w]=([]w)=([]w]=([]w)=([	(((-/	(\(\sigma_{1} \) \(\sigma_{1}	{t-pw 0 10 s"1"{+/""(wtf(st f(wt'st')+f2e(out'2ABC'))+f3 10 (f4ED, 's:ABG2MPTV')]+ (twtxpw]e'1')+ (2*(wtxpw]e f(0 1 2 3 4 5 0 7 8 9, 3 3	((-(L((a-+/((tw)[))a)))tp	(**/((((1="w)-1+((1="w)   (1+(-)")((1(1+(1+(1+(1+(1+(1+(1+(1+(1+(1+(1+(1+(	(0.5-11+/'-/(c= w),E(14(2= (me-twomu-\(me[:1],[0.5](1=	((Z f'w)(c1+w)B+)'a''
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#### Phase I solutions

> DIY: <a href="https://dyalogaplcompetition.com">https://dyalogaplcompetition.com</a>

Blog post (coming soon):
<a href="https://www.dyalog.com/blog/">https://www.dyalog.com/blog/</a>

#### Phase II

- > 25 submissions
- > 19 qualified for prize consideration
  - 13 students and 6 non-students

#### Winners

- https://www.dyalog.com/student-competition.htm
- > 3<sup>rd</sup>
  - Douglas Patz (Agile Learning Center, New York, U.S.A.)
- > 2<sup>nd</sup>
  - Rasmus Précenth (Uppsala University, Sweden)
- > 1<sup>st</sup> (non-student)
  - Torsten Grust (Germany)
- Grand Prize
  - Jamin Wu (Monash University, Australia)

# Phase II judging

> 1<sup>st</sup>

- > 2<sup>nd</sup>
- > 3<sup>rd</sup>
- **4**th
- > .
- .

1   Immargance ContractSQ19	7 a was the degrees of each of the vertices' neighbours. 27	e to its initial configuration), then return the infit a argumed which is incremented recurringly so the a twid.	000 0 (TopincaloT'1) i 15 ii	715 n 188 188	200 a 10 0 1 0 1 10 0 1	n n (cano order as the assa, segutive then pasitive).
1 L-Que(4Qta) 10	00 ExpandIPeG-( 01 Eptib-'i-('(f_''1')r(f'1')) a Spiik and brian ab '1' 27	5 )	521 500	755 0 1 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0	22	in ohioù 2r(i.—id) niepty produces the sequences in a
5 . 4 . 7 no no nomingraduats attained at Manual intensecting to fundratica studying nomicies of	00	# Figiatio-Pigiatio;Pigify;Anth;Eptit;Zoto	33 n If you sho't care shoot the function being insertible 35 n then you can eaks it shorter and was (R s.g.;	785 8 725 a Thin in the andy "brint" I wild define condicity. 725 a did the other brints wild be defined in terms of thin bwist 726 a confound with wind-wind relations.	273 a 1276 a 127	ii a (1.1)(1.2)(2.1)(2.2)(3.1)(3.2) is a Then, (châms die) is faided within each of the number poirs is a and batabalour is run on each well weller ofwesh form.
0L_'My direk dangungs was Python, but I have became funder of atalically typed dangs 10 Absolve	6 Join Few Pint Spilt u n Chain the pure functions 20	n Pig-datin-iffus a single word, whether it is starts with a vason or consument.	Sid a Tapinents + ((-0-c) Di sa) a din Si7 a Tapinents + (-0-c) Di-s a tacit		076 s the pucket coin. 16	17 6
11 FilePeth-'/honn/vjon/tucanonts/' 19 19 19 19 19 19 19 19 19 19 19 19 19	# Settler#Lish-( )# Settler#Lish-( )#	Fight- sp(glt-u) - measurement = print   n in platin-rite   n in state   n in s	in a Inserting the Incit form ((>-0-<) [0-x] -minush-surks, NO a but it throws a MOMIN DARK when applied to the number	786 a This is the W relation (clarkvine relation of the Eng func). 787 a 788 a I've defined this brist with function compactions:	870 a / +z 16 870 a / +z 16	id n s.g. the Faces intermediate variable for a surfed code in:
15 - 1. Transit origins the competition. The problems were very segregate.  16 - 1. Transit contract that the contract of the	Section   Sect	for state-p,'w'p-3-d  it supposed a N to a non-character-long right arg.	Did n S. Did n Did n This function "mores" that orrer to leader 26; it show	750 n First, the relation embricas are applied (since M andy turns	100   100	00 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
10	a content and the second	in Saidhai Menali I a	to the reaction function function that write to former to the con-  the man first you accept to first the formetted function  the first and accepts shown in 1-265, which is cannicalised with  the first production upon (1 to access and it is now life, as an  to 1's about accept in the shouled message).	221 a the top face, andy the top raw pole leybel apprind, white the 222 a balton raw gaint the ideality matrix applied with andrix 222 a centrification (-s.).	805 og 15	ik
10 _w-L_'I think this was because of the energenisty exapted questions with great suplements 10 10 Fauction—	6 Britte-( 20 A Nacks a manage with a griffs o. 27	n "hafniy" spitts the right arg inke words (by speces).  B Proposes a space first as it will mark as ther scalars.	Def a the problem spec (i.e. we accome all De are Is, as as Def a I's absold accor in the decaded message).	726 n 726 n Then, the cubes of the matrix are shifted been so the turn 726 n - I protekyped most of these shifts on (2 2 2pail) to brack	865 - 15 866 - 17 867 - 15	n E for "Empily" (maken the fact time shorter)  n & Yed thermather maker in d speces, for mostly  n speces when representing the safetded cube  n in a ball thermather error.
30 Cher 'L' 30 30 30 30 e Cod of particulate definition 31	66 a Marke a sensenge u with a griffs o. 67 a u thereche solvis capeaced of 'd' and '- 58 a u thereche solvis capeaced of 'd' and '- 58 a u thereche solvis of sensenged dissections in u. 59 a - thereche vactor of the deciphered sonnege. 50	Balan' 'n(\$4*a,")  a Zuin idian carried with a space for convenience.	000 Transbac-(	737 n their pacitions.	in /   in	80 s in a fast character array. 30 b. France C. Company Proprieta (Admin) Company C. C. Company Proprieta (Admin) Company C.
20 B Line of the reaction	10 6 6.9. 20 10 10 10 10 10 10 10 10 10 10 10 10 10	D Figlatio-Join*(Figify-Add)*(")=Spiik  ii n Company the Incit (nections Engelter	a became a meanage with key a uning calumear transpartition.  a a : thereafter water key with al famal 1 minored.  a u : thereafter water meriphere demanage.  b a u : thereafter water meriphere demanage.  show itself ment he a multiple at a's	n II smooth he much more nefficient to specify much of the Pall n F, b, B, k and I redultions individually tibe M, bull I Pall n effect these time to do no.	002 8 -2 46 55 50 50 50 50 50 50 50 50 50 50 50 50	
27 25 1 Nonespace Problems 26 25 25 25 25 25 25 25 25 25 25 25 25 25	A C ***********************************	0	55 a share teight much he is multiple of a's 55 a faught. 56 a ≠ 1 a character vector deciphered message.	763 Serif & Berlind & N. (018 Ser) ((Selfet*(s, e))**)	809 a Each codd condution a Sed Sh andrisc. The codumns of this SS 805 a matrix are neit weathers which instinate the orientation SS 805 a of the minimum in their partition. SS	h n faces corresponding to the sefected not diagram is n sharm. To sefected in a searchin orientation, it is not the force and to be freezened and
20 21 AbbraviataIPv6-( 21	is a The mark is created by specific 1 to '.  If a It therefore since not actually matter what the atter	t insurprisis-description  in	50 a n.g. 'AM.' S. Prahisana. Translan. 'O DTFANCES' 50 a cart of carry	This   Eq-((-(M)) (-((Spint)-(-, n))^-)     This   Eq-((((Spint)-(-, n))^-)     This   Eq.((((((((((((((((((((((((((((((((((((	897 B	all for "mail" or the state of
22 n Emiliations of Eacht + pure offee 22 24 Eacht-'	10 n characters in the griffs are. 10 n 10 n 10 n 10 this function wild throw a LEMETH ERROR if the number	e igned a badino-rabigud ("a" carcitaculed with saff) as a mach poir of a badino from a canasand safe new the safe carcitacts and the choracture themselves, then finites a thoracture and the choracture themselves, then finites			000 n.2s the savies statum. On the printing baserd on 1.1st casium = unit under printing baserd on 000 n.2. 2nd cadium = unit under printing baserd of 000 n.2. 2nd cadium = unit under printing baserd of 001 n.2s. 2nd cadium = unit under printing baserd of 001 n.2s. 2nd cadium = unit under printing baserd of 001 n.2s. 2nd cadium = unit 0	NO 8 PIPE CAMMING-GLACKY.
20	on This function widd throw a LDNTH DAMN of the number of a simulation of a diametr is a use or are not appeal. It will constinue to a containing the distance to a simulation of an articularly of the streams too is an article for image in the number of administrate special, though this mended to a be presented with a pared.	s the result.	Transfer alongs produce an enciphered message that is a meditiple of the topured length, as an should not have the a meditiple of the topured length, as an should not have the a meditiple of the case where it is and (if it is and, a it implies the northborned message is family).	750 a baffered as Eacht functions with function compactition. 751 A		to   if \$per_s/\$ bolt  in Finadity, we just moved to subban ment realizes the sunfadded  in and into a plant and absences entrie. Then un're shoul  to be a sunfadded to the sunfadded in an and the sun sun're shoul  to the sun're should be supplied to the sun're should be sun're should be supplied to the sun're should be supplied
27 Ze-(-2'2'-2'-2'-4'-4'-4'-4'-4'-4'-4'-4'-4'-4'-4'-4'-4'		d * Tapbec-Tapbec, Feren  i n Inciphors a Lap-necoded message.	555 566 Sylvan a Shard adga; rolars assungs if ass-character key 567 Sylvanic State of State	755 a blon't put an amampin, I blick pass put like iden. 753 a Thoma blows relations ors "Andro-Lohn" relations. 754 a Thoma blows relations are "Andro-Lohn" relations. 755 a blow as about 1 of 1 of 1, a. first a relation, 755 a blow a blift - I've just shelted noch an ean firm familiand 756 a of blows.	n The mean are idease in carrangement in SP4 mean (1.m. s to 600 m marks in 6 Chabe, y is marks 2 of Châm and Y in mark 3). 52 805 m 22 thomas 2 failum the right-hand rule, 2 professored 52 806 m 18m SP4 mean core ti.	of a Sarry for the hope cameents! It's easy I diese of actual cade of I hope this eaken it nector to understood the colo deput I st
to dephase a Earlt if mano fassed 22 bit (2m/2min) of Freez a a Elast prime if the nexcention resear. 25 bit (a_fmin) for a Elast thank the most pair 25	26 n I consid not come up with a shorter tacit varian, but 17 n here is a lacit samepin anganyi 18 n here	of tapec-topics/series  a incipiors in lay-norated minings.  a in a statementer under all banchs ('-')  a idd forthold y appears.  b a - statementer under all line doctybered	MAR Trinstatutes Deserts (Marchelle)		NOT BE NOT THE TAX OF THE PARTY THE PARTY PARTY OF THE PA	57 68 ) 60
10 3 10 3ete-'1'e(Sone,") 8 3etes with '1' 93	99 s Britis + c(' 'c-')g(c-') %10	5 8 s.g. Turbur in a see asses at a l	170 n Putt w into a ther matrix with num cataman = faegth of a.  171 n a : therether vactor kny.  172 n a : therether vactor maciphared managag.  173 n shann faegth most he n mailtiple of a's  174 n shann faegth most he n mailtiple of a's	The o The shifts are a fifthly tricky to sark and 150 a sizes they shift across same, but prototyping	n wild though, and their partitions switch. Since much sint 1810 m code has the same cafeer suppring as the same packed code, 25 m code has the same cafeer suppring as the same packed code, 25 m c 2 and y same to tacked their arricalisations of a mach sinicialism. 25 m c 2 and y same time to deliveration mach sinicials a supposed radiants. 2 50 m c 2 m	50 Izeberg-( 51 n q in (all)
66 a Chrising the pure functions together. 22 67 July 8 Senson tofics-Strip Total u 23		a H.	572 a shann ineght ment he a meltigin of a's 170 a ineght. 176 a - : thoracter entric tabulated seciphored sonnage.	150 a since they shift across asso, hel probabyping and the SEV with (2 F 2 p x 3) was an entigibation 361 a superione. I summed quite heat the time to an 362 a if purious thanks shifts could be such superior. Stangle 363 a that's deficitation countries (7 of the to 6 F 2 had time.	052 a da far which caid carranguada to what in 30; I found it baigeful - 50 05 a to cappare to (2 2 3px5) to debending mans.	on cannot be as a second function of a second function of a second function of a second function for a second function function of a second function functio
of a I implemented the keeper function recorrienty because of the reprirement 20 to that and the first section of castignous 8000's sure to be reserved 55 to (Resoure research to first section the section). 25	Martin-type   Staffin a vector   13    Pick-type   n restainty pick on obsessed   12    opPick"Harffix   n shaffin the vice, resoluty pick each, restage   12	0 n I wrote two insertible beigns describes that are n shared between Taglics and Taglics. Taglicacks and Taglicacks. 50 n	176 B. SS. 1484 Tabada Bahar 10 DTERROPE'		016 B 12 2017 B 2 2 2018	in To-(d-(seed)-d)on Trapezate'rs  if First, calculate the Trapezate's from 0 to a technicus.
51 a (Remove removes the first machine blee switz). 33 53 53 13 15	27 ) 10 10 HelpHings-(	n han't work on mid, but could be general approach.	576 a 670 570 a FD 600 a 80	166   Hep-    166   r-1-	918 8 1 2 919 8 3 4 919 11	Sign of the desire the description for Market Andrew a Resent the
Di Conponenta-	10	6 a Percea the cheracter string talls banck nequences. 7 4a u i thereafter sucher of beautes delicted by spaces. 8 4 voter of 3-diseased tellager suchers of bancks.	DEL BES DES DES DES DES DES DE	700 'F'-mails in inchir) in a 710 'B'-mails (DF) in in in a	021 8 5 6 10 022 8 3 8	the structure (from wheal 2 can nesterchain at famel). Tried is in subject that had not seen a seed of the seed of
16 a Counts the number of connected components in a graph. 35 57 a u.1.2-calumn integer entries of graph (onlys first formet). 35 58 a i rander integer of number of connected components. 35	to are indexed as one of the heard's find heard with,  of a firm hear a subspect softice of the find heard with,  the heard (nonzing no repeats), then piezes aims.  the a then tentes and realogue to the question.	n - 1 vector of 2-element tologor vectors of branks.	(d) n d campining tacit version; (d) n (d) n Tabaintoine → 4 + p² (f+) » ((f+) » (f+))	771 '2' 'ma(GF)'s 772 'B' 'ma(GF)'s 773 'b' 'male de(GF)'de de «	003 m 005 m Those manhored miniculous correspond to, inching at the fract of 005 m of the corted code (red and white colours marked with k and W of	60 m Radia Radat Radia Radia
50 8.9. S.Prabine. Companies 50 2 p 12 13 1 2 1 5 5 9 5 12 9 12 2 4 - 20	4 n al those testicae and restopes to the specified 6.6 n dissectant.	1 1 2 6 2 1	007 a It isn't more brief than the amplicit afe though.		026 n respectively): 12 027 n 12 000 n 12	55 8 kitt kiti9 kiti9
63 a I defined a height function for this problem and, Neighbours, 36 63 a to find the neighbours of each vertex. 36	A 3	5 Tephno-(Tephnocke-TepLocata**1)Feren	00 e(e Trindatales n)[jiin]	777 'g'-mi(fa <sup>2</sup> e)m 778 4	200 / 3M / 5m /   50 50 50 50 50 50 50 50 50 50 50 50 50	60 n
65   Capend-(n(r-60-)en.e(n))   25 66   Satische med appeads the satisfamoring partiess of each   25	A Maighbears-( ) of This is a beigne function for Hadium Problem Ent 5, Problem 2.	a Pursan the sociplored assumps, then soken a san of the invertible bath functions I defined a to invert the society,		700 n Nope characters to performing robations. 701 n u : Detection to robate. 703 n u : character scale risinguister robation. 703 n u increase receive singuister robation. 703 n ou : 0 for cischeius, i for sobicischeius.	233   134   34   14   35   15   35   15   35   35   35   35	72 n 73 n
to happen-un("u)-un(u) 35  To definct now appears the neighbouring vertices of mash 35  To vertee in a fish of vertices. 35  To vertee in a fish of vertices. 35  To vertee in a 1 "greend truth" vector of mach vertee's neighbours. 35  To vertee independ truth vertee in the province of mach vertee's neighbours. 35	Registers—	e Compute with TapEnc's Sined Sines	500 m indican that smald nort of (i.e. the reverse 505 m of what was said to sacipher the encauge), 506 m lines the second is not indeed.		00h s       /  /	Th B TS a Consider events.
70	56 a in arter (i.e. ith adament contains a waster of the bit of its adjacent workican).  57 a its adjacent workican).	d n Topfoc kooder Topfoncku-Topfonckin d n Topfoc (Topfoncku-Topfonckin-T.) Perso	107 a d bacit version:	765 n Ali Drinks are defined in Earns of M. M. y. and N. 765 n	937 1 1	77 n i. Start at Rului. 26 n 2. Securatesty go to Rului, Ruini, to Rului.
72 n 12 2 73 n (it appears and the vertices at the seed depth, then 35 75 n surface and sales them). 36	50 n Holghaurs 5 2 p 5 h 1 2 2 3 h 3 2 h	6 v TapEnc-TapEnc_lassier	00 a Transles + ε (ε-φ-φ-) [[2] Talaslabales 01 a	700 a feliciacheine Evicks junt need to canabal sees 200 a of the Evicks/rubnises 2 tiens.	900 Cotoner-5 Sp'UMSAD' 15 901 a 2 Se2 cotone character matrix i.m.; 15	10 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
76 26	60 61 63 8 4 5 9 6 3 9 6 6 9 6 9 6 9 6 9 6 9 6 9 6 9 6	o vignac-ispace; manually utilit top cash.  7 a Extiplera a manuage u with top cash.  8 a u i thereafter scater are under annuage.  8 a — i thereafter under manualphresi annuage.	600 m This function is very similar to that of 600 m the seciphering function. 60 m	a I maint op with using a parent of a faire in a for unishingth of his bank in the life in complea, it is not siltening in the unit in to life in complea, it is not siltening in the unit in the life section in the life in	(A) 0. 0 10 10 10 10 10 10 10 10 10 10 10 10 1	60 n 6. Sm hack to Ruisi. Evaluate Riisi and rebore (Raisi, Ruiki). 61 n 7. Sm hack to Ruisi. Recordingly go down to Riisi to Ruiki? 60 n 8. Evaluate Ruiki? = 7x521 (1-indexina) and rebore.
77 FARMARS—[Sci(*For*Fores)]  18  19  10  11  12  13  14  15  16  17  18  18  18  18  18  18  18  18  18  18	t Broup-(s[an](s,nm)(s[am]) of a Koya a group by near two calcane specified by approach.	n n.g. Toplice '495.'	06 a For comparisons	700 n I originally wrate a ringin function that small 700 n app own a first of 7 or no personance in an attempt 700 to send of the first than the control of the first terms of the firs	046 n 80 n k mt -2, 0 mt +2 11 046 n 12 12 12 12 12 12 12 12 12 12 12 12 12	65 a B. Sa back to Ritis, Evaluate Ritis and return (Ritis, Ribis). 65 a 18. Sa back to Ritis, Condute Ritis and return (Ritis, Ritis, Rib
10	to free-(c(am)(s,con)(s(am))) are the actions questived by approach.  So no year a ground person to actions a questived by approach.  So no six of the second by the secon	a The energy can only consist of apparents delters 6-2.	107   n Transfer abje Tahainkafer u)[ μ 4α]   100   n Transfer α (α Tahainkafer u)[ μ 46α]   100   n Transfer α (α Tahainkafer u)[ μ 46α]	766 n I can'd just one over so array, but that was very 767 n assay.		n a la I start from the apper inft career recursively, and travel
03 n Fillhalfs ((1)(2)(0)(3 0)(0)(0)) 25 06 n	60 n - 1 3-calumo matrix of the un-th calumo of u 45 70 n graqued by calumo ou. 45 71 n n.s. 45	in a I wann't mare from the problem statement whether we should it is been in it the encamps contains after one-appearance alphabet in	idi ) idi TrensCon-i	700 n T bina wandered wholker I cauld box functions 200 n m first-class citizens, had it doom't meen cite 201 n st divide in blod.	000 Watchesse-[-colores(+5+],30-5++7) 11 000 a biddes soft vector to their corresponding colors 11 001 a w 1 a 3-sissent unit vector puts to +/- x, y or z. 11 002 a - 1 a confer character insticuting the colors 11	is for I their from this upper (self corner recordingly, and trained to its the right from top to down, every column has account to the a values of the previous column, which therefore feel I have been been as the previous column, which therefore feel I have be to the reaction black. We used you not be rather the sentence of the previous a calculum became that I will that it operated more, that way, pur should be a part to the best of the previous of the thind the previous of the previous
66 UI 97	19 a (1.6mr 2) 6 2 p 6 4 1 2 2 3 4 3 2 4	in a characters.  n of a Year can general against it to return aid by secondaring below:	a faciplers emerge u with key a uning calamor transportion.  10		063 m.g. Natchdulaner 0 0 1 m birth wacker painting to +z 15 065 m. O	n catum because that's not that's depended on. This way, you should be n got to the batton right by going catum by catum, top to down
00 n in the mobiling process of connected components (now though they 37 to a new separate components). 27	1 12 V	0 e -s/sc(01.0	116 n - 1 theracter vector encipheral annuage.	NOT n day non-tinguotaber characters are simply NOV n skipped and relate the colon as in.	0056 n There are andy 6 passibiditions this could also be a general of 5050 n ofte.	77 a Tie sufer recursive function man place the discussive the
01 Fines-( 17) 03 Fines-( 17) 04 Pash-(s_Fitthetis)s-Espers's a Fine all sanighbours, then sob 27	77 17 2 3 3 10 10 10 10 10 10 10 10 10 10 10 10 10	n I wrote two incertible beigner functions that are is a shared between Topins and Topins; Topinska and Topinscate.	10 a DITERMENT CHIT OF CHARLET	Permo-Cy. ("a) ("c" "" ")	560 a sit.  560 a  560 a s-(-) 1 *sa which aris in the anti vactor s(1), y(2) ar x(2)** *  561 a 2-2-4-7 1 converts the 1 take 2 and the "1 take 1 for industrial  562 a 2-2-4-7 1 converts the 5 take 2 and the "1 take 1 for industrial	00 n inner recursion function goes along the column. 00 n Bedanz
00			33 Septem o Beard segan return original if non-cher key 32 Septembro o Beard segan return wit if assumage in wil		963 m B-Colours ; tedeses tota 30 antrix Colours 51	00 6 Bodani: 00 n Rom annon. "garing meranu a med n" 00 n Romanne "for consideri n, going along a valume"
of a Becarries function which redures such and af connected components. Since a 1 "greated brails" unclaim of such unclaim confidence. Since a 1 Programation unclaim such such as described and. Since a confidence and such such as described and such such as described and such as describ	All Markety (A) "vs. 16 Annals Nay for nock vertom. 17 Annals vertom. 17 Annals vertom. 18 Annals vert	n u 1 3-element integer wather of beach toposene.  n - i theracter wather of beach; ('-') and peace; (' ')-  n n.g.	Trindstatus (na=8-(fa) sfa)  35 s Pais w into the entrie, with nan calama = inegth w.		100	
00 8 8-9- 01 8 Fined: ((2 2 7)(1 2)(1 2 4)(2)(6)(5)(1)) 28		9 8 Reader (5.5)(5.5)(5.5)	150 m Puls w indu ther entrie, with our calama = fought u. 156 m u.i. a thoracter under to use as the kay. 157 m u.i. a thoracter under message. 158 m is a thoracter artir to basis date description.	815	067 n the 3st unit uncher andris to index for each ainical = 11 068 n which ains carraquest to the aris of the second = 11	07 bi
00 a 1.2 2 \ \ 7 6 6 50	100 0 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	Tapins-basis: Tapinscks-Tapinscks is an insurtible function  n Tapinscks-Tapinsch is an insurtible function  n that cannests a character scaler or vactor into	150 a n.g. 'APL' Tabaslatatine 'CRIT OF GROEK' 151 a GROT	EIS Folds-(*en-/c(en),en) is nirmely ankabi (aked by byndeg I EIS n blick - a single fadd deft operator.	900 n packet cube to tendo actog as nineg. 11 970 n u i do illeger scalar carrequesting to the index 11 971 n to occase along the on-th acts. 11	00 Martu-t v(s-4) n Calculats prov Run for given n 10 McRin-(find-D-n)v((b-n)nlabrus[4])-((denfrus[n] n Nou k vo 11 Rest, labrus n Proposal accusalats it to save the value
26 a Il naponis noch verten into its neighbouring vertices 20 22 a proposeriority and party and mine the sale - when add the	á i i i i i i i i i i i i i i i i i i i	t n a coposeco of knocks n.g.	332 a 66 333 a 68	600	079 n ink ninement in the tentes, named in the sein. 11 073 n on: 2x2x2 26 notrie colo. 11 074 n.g., 15	15 )a n Start recordes with a = u = a.
07 a programming and marks and subs the unit - whom aid the 50 00 a managed companied or found, separating the cell use's 50 00 a change separate, 50	4 : U	Topitoschu-Topitoscolin '49%'  1 1 2 5 5 2 1	NS B I sciglantly wrote this as the feddawing Easit	1022 a First, paras the instructions. 1023 a Thom, risk the supplier function to the daft 1034 a with an initial cales near the instructions.	276 n.g. 1 1075 n ist raw of nock einicade in index 2 15 1076 n nides jak big-code mein (belten raw) 15 1077 n i (Code Ch) 2 15 15	ii olean ii n Bun cambaine bhe inst caisme we calculated (i.e. ali
ii ffices brightners a 50 a This fact (ice just rose the input through Neighbours, 50	of a bland for unfully stock keying won't takeninks megiting to be a that demon't appear in the seign (int (i.m. medes with no seigns).		100 a Tahutabafac → T > c= t= (\$4)   >=x=\$	856 857 w Martinabi-Maritnabi	070 0 10 0 10 0 11	55 Marc in the captures the fact calumn us catculated (1.π. add a Racas for a - 0 ha a add a - α (1s the diagram shames in a 1 to suid in the a no-excluse castiviting \$1.1.3, \$1.1.3, \$1.2.3 in and \$1.3.3, \$1.1.4, \$1.2.3, \$1.1.4, \$1.1.5, \$1.1.
13 n then Fiscal, then finally counts how among connected 20 14 n companions/scale were found. 20 15 ) 20	00 #11go-(4[de/23.23) 01 n Sarta ombris by the first coises, then reborns the necessions. 02 n u.1 2-caises entries of zertheles. 03 n - u uncher of zeen elements as les taises of u. 04 to the coises of the coises of the coises of u.	S a Reseter than simply reseters the bracks into a string.	No. a but it's set all that each shorter.	100 hebitable-as 'entantifile' ((per-ab-(a)-))- 100 n Prepara is handmer-enhaged 'vid as each pair of a 100 n heaf from a n used each zero the tend thoractors 101 n and the interfedent charactors, theseafore, and	0790 8 1 1 0 0 1 0 0 1 0 0 1 1 0 0 1 1 0 0 1 1 0 0 1 1 0 0 1 1 0 0 1 1 0 0 1 1 0 0 1 1 0 0 1 1 0 0 1	n moment RITES as an examply take the first value. Them 21 n as're deem!
16 17 • CamilWines-CamilWines 20 10 10 10 10 10 10 10 10 10 10 10 10 10	n - 1 weeker of mann ofseneths as 2nd column of m. to n n.g. tiles t 2 n t 2 2 1 1 2 2 t	s Topfracks-Topfracks  n This is a holper function for Eusy Problem Set 1, Problem 3.	AND adjoint Transactions (0,144) An Inducation the assumps series beinger Transactions, AND a time surfut the table contames by the feetices And a sabicial search act at the transaction and	831 a sed the individual characters thomselves, and 832 a then finites the result.	003 n 005 n e(2 2 2 2 2 5 1 1 2 3 % (fail dH nath = 0.4m m nath) 11 005 n e(2 2 2 2 2 5 1 1 2 1 2 5 6 (2 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4	23 ) 34 SS
	00 n.p. diign+2p+331122+ 100 05 n 3+13 100 101 102 103 103 103 104 105	Tapitancia-unid-E Ey-4 n Converts Polybius disk insiss to number of nuccessive branks.	006 m which smeld sart o, then transposed and 007 m and inked.	ES Vertela-(		56 Stepson-(
22 n line multiplies it by a hardens mark indicating 20 23 n non-mines (na mines horsen B), then subtracts the 20	of dign(d Group 3)(Hambun) <sub>2</sub> ((d Broup 3) <sub>2</sub> (d Broup 3))Sau to the time therein the functions to make a restair of the notification to make a restair of the notification.	Tephenological Re-2    Converte brighton field tomin to number of numerous branches.	NAC B I mins and this written as a East function;	n intracted the cale richs a thoractor endrise of fees caleses.  829 n s is Daniel 30 matrix and academicing a 360 8ft andrise 820 n (i.a. the cole).  820 n - 4 6ft thereafter endrise of fees caleses.	000 s Facas an angulium cidas of manus (i.m. where was = 1) manel be her = 10 000 s their cadesers recorded cidas it in the apparite side that is as = 1 000 s	08 Confro-del 4,5 4p==4 100 With-(-/-)n= 20 Intrasta-((2n),=(m)=(n Visth n)n(sa)-4) 21 (do-Visth n)n-(Confro c)ma a Intrasta n
24 n setra non back again (an einem bacans -1 sed the 25 25 n sehied 1 cascain sed). 26 v	nti a f. Performs "group by" of each raison of the edge (isk new the older by 12 a This gives the avighbouring sedes to a worker is each direction.  12 a 2. Inten beith, then joint then with a black.	is a the number of branchs in macrosition.	55 a Transfer + c-h (c-h-) [[2] Tahadatafar 55 a fat I found the dis ours understandade.	250 s -1 fed therefor entries of face colours. 500 s 0.0. 501 s 100	000 e.  Oil e. The rask of the eleticales are accessed (set the columns) became " 1002 e. seed to first detch arts of the columns access pointing to the six 002 e. of the arts of following (set).	21 (See Visth s)s+/(Chaffe e)sen e Interests s 22 n This is minust the next same as Traparaid; in fact
21 10 1 Oder-Oder 21 21	a n 2. Inter them both, then joint them with a binair.  In the binair is necessary in case working short appear in fifth the page (or in the p	1.12521	MA 1	0\0 n W 0\0 n W	11 To 10 To	This is adomat the small same as Traperridg in fact by a Width and Inderests are smally the same function  I width not Inderests are smally the same function  and candid the samed the line global consequence inclined.  I have not a same of the same of the line global consequence  a samble or to the fact time of 3 have, y in reparation.
10 a This stindic function creates a sarbad Babik's sale. 21 a Pinnes use the camends under the Media's function for a description 22 a of what the color data structure represents – in short, the 23 a sale is a being resis	a 2. John Line hall, Line jaint line with a blank.  1 The blank is instancy in team certifies and appear in  2 The blank is instancy in team certifies and appear in  3 The forms a group by of the appropria.  3 to be you are the best; a made boy?  4 to be you are the best; a made boy?  5 to be you are the best; a made boy?  5 to a singlement good of restricted antiphenent inde said  6 a minglement.  5 to 3 to 1	B a This East function is immrkible.	Trisb-[  50 a Perferent brinks so a cohe (skruchers described in birisid).  50 a a : therecher scaler or sucher of brinks, in order.  60 a u 1 birds 30 matrix cohe to brink.	ING A DIGHARD ING A W	006 o Fe for "Faces" (makes the deaf time shorter) 007 o This variable pole the colours of each of the sie faces. 11 009 o This variable pole the colours of each of the sie faces. 11 000 o this he intermediate variable sharing a 6-decemb rectar, 11 000 o which holds 2nd character embricas of each face in the order. 11	27 a The andy differences are the conflicteds and non 28 a number in the inst time (2 here, 2 in Trapezzie).
22 a of what the cube data structure represents - in short, the 21 23 a cube is a 3x3x2 return with each element hadding 3 unit-restions 21 34 a perpendicular to see meather. 22	n maccany acros on wrections suighbours take add 50 a neighbours. 50 a 50 arts then is order by vertex.	n n.g. (Topilonckn-T-1) Topilonckn 1 15 11	550 m = 1 character scalar ar machar of brints, in order.  660 m = 1 20202 35 matrix colo in brints.  661 m m.g.i	057 a W 056 a I how channe in represent the code as a 2x2x2 20 matrix i 050 a little contribute 22 matrices is each ofesset. i	000	NO )
25 22 26 Chin-2 S Spel Spil d d d S d d d S 27 T 25 25 25 25 25 25 25 25 25 25 25 25 25	10 En Salada - Balkalka - Balkalk	**	663 663 664 m Bulbulian matricas for twister	NES a which combines 2nd 20 metricus in much minemet. 1  Edi a 1	003 a   1   11 003 a   3   5   6   6   55	nd Trapazold-(
30 begress-( 32 begress-(  32 begr	15 Epith-(4 fm)"(Blandler n Spitt w into succession pairs 51	u Tapiacata-Tapiacata_Tapitiphu i n This is a helper function for Eusy Problem Set i, Problem S.	on habits entries for bright.  Intelligent at a first of a habits and rectanders about to the bard of a first of a habits and rectanders about to the bard of a first of a habits and rectanders about to the bard of a first of a firs	853 8 0dm = 222 p x 23 p 1 8 8 5 8 8 8 1 1 1 1 1 1 1 1 1 1 1 1 1	005 8 17 1 55 006 8 17 1 55 007 8 1 55	Conffs-5)"3+5 2,59"3-6  6 Creates 3-water backed at atther and by in given  1 a (ann-inas) atta right argument.
NO a Calculates storms of much works given soign (int. 22) in a 12-catum (storms makers of graph (soign (int farmst). 22) in a 1 integer worker of degrees of workson in order. 23)	16 Cond-origin(refres.) 8 n Finithmen kep of sight from 55 cond-origin(refres.) 8 n Tacts marking inflam 55 cond-origin 8 n Tacts marking inflam 50 cond-origin 8 n Tacts marking inflam 50 cond-origin 8 n Tacts marking inflam 5 cond-origin 8 n Tacts mar	Tepdapha-iddinerunitenenganthannyi- h n I'un defined a andfised adjabahil isaland of sating Dk na n his function can be insurtible. Explatened before.	560 Is-5 5c 4 4 5 4 4 4 5 a Tenatty matrix 660 a Those 50 relation matrices are simenised and widi, when	100 100	000 a (name order as the same, negative then positive).	ME
N3	20 4 Sti		ore noncris-mailipited by the 2 unit undars of each steiche, 171 n rabbs them noit undars as required. 172 n (though do solt - the cole mean don't fedies the right-band	1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	010 n ohtod 2r(1-54) simply produces the sequences 11	on Colorate the width of much interval given a  to a Colorate the width of much interval given a  to a 3-demonst marker right argument range, and a number  of one (non-demo) number of intervals (aft argument.
A6 22 A7 +/(\$***_***)as 33 A8 25	27 Crear-1 Silver 1 A Calculates the arms of a biogenister algorithm. Silver 1 A calculates the arms of a biogenister algorithm. Silver 1 A calculates the arms of a biogenister algorithm. Silver 1 A calculates the arms of a biogenister algorithm.	7 Tepicothe-((De:[86:-))(Tepidaghers)  a finch (ablar induc to manifries algobabl (deading I/I).  a u iteraction scanier or realize assumps.  a - i tologue scaler or realize of "algobabl" indicas  i to be reage 3-55 Scaleric (on 26.).	573 a ruda staco I choca to use 694's unic urdering and makes 770 a negative/positive correspond to accomming main indicas, as 775 a the signs mend to be reserved for use of the asset if 776 a guing off a standard teatheak accoming right-band asset). 777	860 8 1 0 0 1 0 0 1 0 0 1 1 1 1 1 1 1 1 1	013 a (1.1)(1.2)(2.1)(3.2)(3.1)(3.2) 014 8 015 a Theo. (Chiao Ch) is fulfied wilkin each of the names units.	
no a Singely counts the accurance of much various 33 to in the onign (int (i.m. how among seigns since this 35 to a various house) 33	a Calculation the arrier of a Kingovictor edgerithm.  50 n u character sucher Kingovictor edgerithm.  51 n u character sucher Kingovictor edgerithm.  52 n u character sucher Kingovictor edgerithm.  53 n u character edgerithm code.  53 n u character edgerithm order.  54 n u character edgerithm order.		176 a gaing off a theader textback measuring right-load axes). 177 a 178 a See ble diagrams in the binded dumbling for reference to		015 n Then, (chino Cm) in faidadu dibbis mach of the number pairs 1106 n and Matikiniaur in rum an mach unit wester ofmach from 1101 n n n. o. the Faces independinds wardade for a sarbad sale iss. 110 n n. o. the Faces independinds wardade for a sarbad sale iss.	leteruta-((hm), "(m)+(a Visit n)*((a)-f)  is a fractar a maker of internals given the (non-less)  is a substar of internals cast argument not a 2-element  is a vactor right-organent range.
51 n surtes here) 52 n 32 53 n With speces. 53 n With speces.		Toptacato '494.'	170 m same_	055 0 10 0 10 0 0 0 0 0 0 0 0 0 0 0 0 0		(\$0% Visit s)=>/(deaft s)=ss < lateraria s is Onios the pure functions to create the specular.
5) 55 8 4 ( 344 1.4 1.40 ) 6 18	d n w : 2 tdtd 2b matrix caba. 55 A n - : n 13-minument vactor of 3-minument sket products. 57	n This back function is insertible,	At a linfortheadaly, Siegovinter u/y/r shan not correspond to the did a merbering of SMA none - I had to chance som to fedies. Here's a did a correspondence chark:	860 8 1 0 1 0 0 1	0000 0001 0 000 VV UX 100 000 000 000 000 000 000 000 000 00	(de'n visit a)s=/(Camfr a)sac a labraria a  (de'n visit a)s=/(Camfr a)sac a labraria  a Camfra lin para functions in rocks lin specular.  a Camfra lin para functions in the labraria  a Equit on the function see in and in points in this indexess  a line multiplies by the smalliplier camfrictening,  a name, then sactively one by last the camfraided width.
57 s. f. Finitess the odge first 58 s. Emmarates (winger from number of workiess (first of animals) 39 50 s. Constate other product with odge first (20 recover animals) 39 50 s. Loss on the first acts 50 s. Loss on the first acts	10 n = ng. 51 titl Twist Ode 51 titl Twist Ode 52 titl Twist Ode 53 titl Twist Ode 53 titl Twist Ode 53 titl Twist Ode 53 titl Twist Ode 54 titl Twist Ode 55 titl Twist Ode 5	0 n (Topkscato-T1) i 15 ii	006 m 006 m Siegmoiskur w - Ciackwine reduction should Cohe marke y 006 m Siegmoiskur y - Ciackwine reduction should Cohe marke w 007 m Siegmoiskur z - Ciackwine reduction should Cohe marke w	872 873	03%	o name, then multiplies by half the calculated wiells.
	55 a 5 1 5 1 5 1 5 1 5 5 1 5 5 5 5 5 5 5	ti n 2 n 2 n 3 year sho't care should the function heing invertible 6 n then year can make it shorter and ann (b n.g.;		676 a Each caid of the 2x2x2 cohe corresponds to one "minicohe" of 1876 a the packet cohe.	105	6) 16 (Collegarphen
2 s I wrote a height function, Neighbourn, for one with 20 s little problem not, but it's and encourage for this problem as 20	of a Thin provides an easy way to compare colors that 50 a are the same but when's related in a different 50	n then you can eakn it checker and use ()t n.g.;	a I preferred failuring the SM case for the data structure to a se it each it easier to think about, whereas the	877 n i	000 m in a fast character array. 11	60 JEuffmerpece

https://www.dyalog.com/uploads/conference/ dyalog19/presentations/U13 How I Won the Competition.html

# Phase II judging Nitpicking

### The 2020 APL Problem Solving Competition

- ➤ Spring 2020
- contest2019@dyalog.com
  - I have problem domain suggestions
  - I want to be notified of details

# Next webinar: Thursday 21st November

- qWC (Cross-platform WC) an Introduction and Update
  - Chris Hughes (MJH Software Ltd)