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"EFCGG9H9C=' \* %/.2&! 4 F/% (% 9)!D/-:-'.L!>+%.(+/! \* 30,:%2&+MN+G'%0)!D%/,2% 9 + &.%/2%&!

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 $\begin{aligned} 4''-32\%,+!D/-:-'.!*\%/=!*-''9\%\&!</-:20+0!'+\&\%,-/'!G2.(!\%!F/2+P!-:+/:2+G!-P!.(+!/+%P2/9\%2-&!<\\ </-3+''!P-/!>2B(+/!1+\%/&2\&B!5-992''2-&!_>15`!%33/+02.\%.2-&#!A(+/+!\%/+!.G-!9\%2&!3-9<-&+\&.'!.-!\\ .(2'!</-3+''l!.(+!P2/'.!2'!\%!,\%/B+!'+.!-P!G/2..+&!0-3?9+&.'#!A('-32\%,+!D/-:-'.!*-''9\%&!+Z<,\%2&+0!.(+!\\ P2/'.!<\%/.!-P!.(2'!0-3?9+&.\%.2-&!3-&'2'.'!-P!.(+!\%''?/&&3+!%/B?9+&.)!G(23(!2'!3-9<-'+0!-P!P2:+!\\ 3/2.+/2\%!-/!3(\%<-,+'!G(+/+!2.!2'!0+9-&'./\%.+0!(-G!I@[!9++.'!.(+'+!2&02:20?\%,!'.%&0%/0')!'292,\%/!.-!\\ .(+!.E<+!-P!/+<-/.2&B!0-&+!G2.(2&!+0?3\%,2-&#!I@[\'!0-3?9+&.!3\%9+!.-!aV)VVV!G-/0'#!A(+!'+3-&0!\\ <\%/-.!-P!.(+!G/2..+&!0-3?9+&.\%.2-&!2'!.(+!+:20+&3+!P2,+!2!M)+2.+!2&3,?0+'!<M+'!.(\%!I@[!0-+'!+PP232+&.!%&0!+PP+3.2:+!'.?0+&.!\%''+''9+&.)!P-/!+Z\%9<,+)!.(+!+:20+&3+!P2,+!2&3,?0+'!<M+'!-P!\\ 2&P-/9\%.2-&!0-3?9+&.2&B!+:+/E!\%''+''9+&.!<,\%!-/!/+<-/.!'(-G2&B!.(2'!.E<+!-P!2&P-/9\%.2-&#!!\\ 4''-32\%,+!D/-:-'.!*-''9\%&!'.\%.+0!.(\%.!.(+!+:20+&3+!P2,+!2'!B2B\%&.23!\%&0!2&3,?0+'!+:+/E.(2&B!P/-9!\\ 3\%.\%,-B'!.-!54Q47!92&?.+'#!C.(+/!%'<+3.'!-P!.(+!G/2..+&!0-3?9+&.'!2&3,?0+!!&!2&!-0?3.-/E!</*B+)!\\ P-/9')!'?3(!\%'!.(+!P+0+\%,!3-9<,2\%&3+!P-/9!\%&0!\%!5CR@''MUb!3-9<,2\%&3+!P-/9)!&0!9?3(!9-/+#!\\ 4''-32\%,+!D/-:-'.!*-''9\%&!'.\%.+0!.(\%.!\%,..(2'!0-3?9+&.\%.2-&!G\%''!3-9<,+.+0!&2&+!0\%E'!\%B-!%&0!\\?<,-\%0+0!.-!.(+!>15!'E'.+9!-&+!0\%E!+\%/,E#!$ 

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4''-32%.+!D/-:-'.!\*-''9%&!'.%.+O!.(%.!.(+!'+3-&O!3-9<-&+&.!-P!.(+!/+:2+G!2'!.(+!:2'2.)!G(23(!.(2'! .29+!G2,,!F+!:2/.?%,!O?+!.-!5-:20#!>+!/+3%,,+O!.(%.!.+&!E+%/'!%B-!.(+!>15!:2'2.!3-:+/+O!9?,.2<,+! O%E'!%&O!&2B(.'!%&O!&2E(.'!%&O!&2&:-,:+O!?<!.-!UcM(-?/!O%E'!G2.(!&+%/,E!3-&.2&?-?'!9++.2&B'!G2.(!+:+/E!

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 $\label{eq:solution} \begin{array}{l} \%/-?\&0!\&--\&!.-0\%E\#!>+!+\&3-?/\%B+'!+,2B2F,+!P\%3?,.E!.-!:-.+!2\&!.(2'!+,+3.2-\&\#!@P!2\&02:20?\%,'!\\ G\%\&.!.-!=\&-G!G(-!.(+!3\%\&020\%+'!\%/+)!.(+E!3\%\&!P2\&0!.(-'+!-\&!.(+!;\%3?,.E!7+\&\%.+!G+F'2.+!)\\ ?\&0+/!H,+3.2-\&'\#!!\\ !\\ \end{array}$ 

- W#! H,+3.2-&'!P-/!; %3?,.E!7+&%.+!-PP23+/'!G2,,!F+!(+,0!%.!.(+!&+Z.!/+B?,%/,E!'3(+0?,+0!7+&%.+! 9++.2&B!-&!4</2,1]#!5(%2/)!R23+!5(%2/)!7+3/+.%/E)!%&0!7+&%.+!N-92&%.2&B!5-992..++! 9+9F+/'!G2,,!F+!+,+3.+0!%.!.(2'!9++.2&B#!N+G!'+&%.-/'!G2,,!F+!2&:2.+0!.-!.(+!:2/.?%,!.%F,+!P-/! .(2'!9++.2&B!2&!-/0+/!.-!:-.+#!!
- ! a#! A(+!8+B2'./%/!%'='!P%3?,.E!.-!'?F92.!+%/,E!G%/&2&B!B/%0+'!FE!\*-&0%E)!\*%/3(!Uk!%.!ceaV#!
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  - U# <u>8+3-99+&0%.2-&!P/-9![&2:+/'2.E!4092''2-&'!.-!HZ.+&0!.(+!5?//+&.!4092''2-&'!D-,23E!</u>
    - 54Q47!R23+!5(%2/!5-:+/.!/+,%.+0!.(%.!54Q47!G%'!%'=+0!FE![&0+/B/%0?%.+!4092''2-&'!

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7+&%.-/!\$+,,-..!%'=+0!2P!.(+!3?//+&.!.+9<-/%/E!<-,23E!2'!?&%F,+!.-!F+!/+P,+3.+0!2&!.(+!-&,2&+! [&2:+/'2.E!</-P2,+!F+3%?'+!2.!2'!&-.!%&!-PP232%,!<-,23E#!"2/+3.-/!;/++0!/+<,2+0!.(%.!.(+!QD4! </-P2,+!3%&!F+!<-'.+0!-&,2&+!F+3%?'+!.(%.!2'!3-&'2'.+&.!P/-9!E+%/!.-!E+%/!F?.)!B2:+&!.(+!,%3=! -P!'.?0+&.'!.%=2&B!45A!%&0!74A!.+'.')!(+!G-?,0!&-.!3-&.2&?+!.-!?'+!%!</-P2,+!F%'+0!-&!

 $\begin{aligned} +&3-?/\$B+0\#!7+\&\$.-/!5\%//!'\%20!.(+!\$\$>H!; 45!(\%0!\%!3-\&:+/'\%.2-\&!G2.(!8E\%\&!Q-G+/)!5(\%\&3+,,-/!-P! \\ .(+!+\%'.+/\&!3-99?\&2.E!3-,,+B+')!G(-!.-,0!.(+9!.(2'!2'!F+2\&B!02'3?''+0)!\%&0!'(+!G-\&0+/'!2P!.(+/+!(\%'!F+2\&!\%!292,\%/!02'3?''2-\&!\%9-\&B!<?F,23!?\&2:+/'2.E!</-:-'.'!-/!</+'20+&.'!\%F-?.!,292.'!.-!+\%/,E! \\ 3-,,+B+)!2\&!=++<2\&B!G2.(!'-9+!-P!.(+'+!/+3-99+\&0\%.2-\&'#!D/-:-'.!4F/\%(\%9!/+'<-&0+0!.(\%.!(+!(\%'!K')))) \\ &\&-.!(+\%/0!-P!\%\&E!02'3?''2-\&!\%9-\&B'.!.(+!</-:-'.'#!7+\&\%.-/!5\%//!'.\%+0!.(\%.!'2&3+!2.!9-'.!299+02\%.+,E! \\ \%PP+3.'!3-99?\&2.E!3-,,+B+'!2\&!\%!G(-,+!:\%/2+.E!-P!G\%E')!.(+E!\%/+!9-/+!2\&:-,:+0!2\&!.(2'!02'3?''2-&#!!)! \\ ! \end{aligned}$ 

7 + &% - /! \$ + /&% / 0' !%' = + 0!G(+/+!.(+!<,%&!B-+'!P/-9!(+/+!'2&3+!.(+/+!(%:+!F++&!3-9.9+&.'!9% 0+!-&!2.#!)))))>+!% '=+0!2P!. (+/+!G-?,0!F+!/+:2'2-&'!-/!2P!2.!G2,,!\$?'.!F+!+&%3.+0!%&0!. (+!3-99+&.'!-&E!/+</+'+&!! </-.+'.'#!7+&%.-/!5%//!/+'<-&0+0!.(%.!.(2'!2'!%!B--0!X?+'.2-&#!7(+!'%20!.(%.!.(+/+!G2,,!(%:+!F++&! .(/++!9++.2&B'!-P!.(+'+!:%/2-?'!0+'2B&!B/-?<'!.(/-?B(!.(+!+&0!-P!\*%/3(#!7(+!%00+0!.(%.!-.(+/! /+3-99+&0%.2-&'!%/+!3-92&B!P-/.()!'?3(!%'!2&!/+'<-&'+!.-!+PP-/.'!.-!(%:+!.+%3(+/!+0?3%.2-&! </-B/%9'!9-:+0!.-!3-99?&2.E!3-,,+B+'L!.(+/+!(%'!F++&!'-9+!-/B%&202&B!%/-?&0!.(%.!%'!G+,,#! 7+&%.-/!5%//!'%20!.(+!0+'2B&!B/-?<')!2&3,?02&B!.(+!-&+!%F-?.!(2B(!'3(--,!.-!3-,.+B+!./%&'2.2-&)!) G(+/+!.(+!+%/,E!3-,,+B+!<%/.!2'!P-3?'+0)!G2,,!(%:+!.-!02'3?''!2&!.(+2/!.(2/0!9++.2&B!(-G!%,,!.(+'+! </-<-'%,'!%,2B&!G2.(!.(+!3-/+!</2&3<,+'!2&!.(+!'./%.+B23!<,%&#!7(+!G2,,!F+!3?/2-?'!.-!'++!(-G!.(-'+! P%3.-/!2&#!7(+!'%20!.(+!/+3-99+&0%.2-&'!(%:+!%,'-!F++&!</+'+&+0!FE!.(+!5(%2/!-P!.(+!;%3?,.E! 40:2'-/E!5-?&32,!2&!.(+!<?F,23!3-99+&.'!'+3.2-&!-P!.(+!,%'.!'./%.+B23!<,%&&2&B!9++.2&B#!7(+!0-+'! &-.!.(2&=!2.!2'!3,+%/!E+.!(-G!9?3(!.(+'+!3-99+&.'!%&0!/+3-99+&0%.2-&'!G2,,!'(%<+!.(+! 3-&:+/'%.2-&'!-P!.(+!0+'2B&!B/-?<')!F?.!.(%.!G2,,!F+!=&-G&!FE!.(+!+&0!-P!.(+!9-&.()!&0!.(+/+!G2,,! 3-&.2&?+!.-!F+!/--9!P-/!<?F.23!3-99+&#!7+&%.-/!5%//!+&3-?/%B+'!%&E-&+!G(-!2'!2&+/+'.+0!.-!B-!.-! .(+!@\$>H!G+F'2.+!G(+/+!.(+/+!2'!%!/+,%.2:+,E!'(-/.!'+3.2-&!-&!.(+!'./%.+B23!<,%&!%&0!9%=+!3-99+&.'L! %&E!3-99+&.'!'?F92..+0!.(+/+!G2,,!F+!9%0+!<?F,23,E!%:%2,%F,+!.-!%&E-&+#!! 1

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