"#\$%&#!'(#(&)*!!"#\$\$%&\$'&()*+),,-+)*&.&/O1,-+O%2&!"+,)",3&45,,)&/O-6&7)+8,-2+16&\$'&9\$):\$)3&/+%,&():&;\$O:3&9\$):\$)3&7<!!

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 $\begin{aligned} & -C() \# / (-\#)! \#0!, / = \&OC(! \#(64-,6\%7! (33,6,(-6:>! Z\%-:! 03! \#4(!\&(30\&/)! < (\&(!,/=7(/(-\#(1!;:!))! 60-))))) \\ & = O(!,2\%7!, -8!3,\&/))! = O(!<(C(\&!,\#!,)!) - O(!<,1(7:!\%66(=\#(1!\#4\%#!=\&,C\%\#,)\%\#,O-!<\%)!))) \\ & = O(!) + O(!<(-\#!,\#!,)! - O(!<,1(7:!\%66(=\#(1!\#4\%#!=\&,C\%\#,)\%\#,O-!<\%)!)))) \\ & = O(!) + O(!) + O(!) + O(!) + O(!) \\ & = O(!,2\%7!) + O(!) \\ & = O(!,2\%7!) + O(!) + O(!)$

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9 - !&(#&O) = (6#*!, 3!#4(!\$7#, /%#(!O; 5(6#, C(!O3!=&, C%#,)%#, O-! < %)!#4(!#&% -)3(&!O3!%!7%&8(!=O&#, O-!O3!#4(! $(7(6\#\&, 6, \#:!)(6\#O\&! \#O! \#4(!=\&, C\%\#(!)(6\#O\&^*! \#4(-!\#4(!(B(\&6,)(!N3\%, 7(1M!\%66O\&1, -8!\#O! \#4(!)\#\%\#,)\#, 6)))))))$ Q660&1, -8#0!#4(!9TQ!VEFGFW*!%)!03!]G'"!D\$7: !EFFS*!9-1,%!4%1!%!#0#%7!03!G^G*!FI]!Z_!03!, -)#%77(1! 6%=%6,#: !03!<4,64!`H>^ a !<%)!=\$;7,67: !0<-(1*!(,#4(&!;:!#4(!)#%#()!0&!;:!#4(!6(-#&%7!80C(&-/(-#>! $(!)^{(!)}_{0} = (-1)^{(-1)}_$ $80C(\& - / (-#M)!)4\%\&(! < \%)!] a !0\&! \ \ SIF! Z _>!! _ 4(#4(\&!, #!4\%)!; ((-!#4(!3\%, 7\%\&(!#0!, -#\&01\%6(!$ 60 / = (#, #, 0 - ! < #, #4! % - ! %, -60 / = 7(#(M!8&, 1!% - 1!64&0 - ,6!(7(6#&, 6, #:!)40&#%8()!0&!#4(! - (%&!60 / = 7(#(!)2))))))30&!#4(!=\$&64%)(!03!#4&((!1,)#&,;\$#,0-!3,&/)W!#4(!)#%#(!,)!)#,77!7(3#!#0!#%6A7(!#4(!/%-:!64%77(-8()! %))06,%#(1!<,#4!%-!(7(6#&,6,#:!):)#(/!\$-1(&!)#&%,-!V.\$;%)4!b!",-84*!EFF^W>!_4(&(!#4(&(!4%)! ; ((-!%!64%-8(!,)!40<!,#!%==&0%64()!#4()(!64%77(-8()>!Q!1,)#,-6#!64%-8(!03!#%6A!6%-!;(!1(#(6#(1! % < % : !3&O / !#4(!OC(&!&(7,%-6(!O-!#4(!OྪB:!O3!&())#&\$6#\$&, -8!%-1!=&O / O#, O-!O3!6O / =(#,#,O-!)%-1!640,6(!,-!#4(!)(6#0&!#0<%&1)!#4(!1(C(70=/(-#!03!/0&(!=%&#-(&)4,=)!<,#4!=&,C%#(!3,&/)!%-1! =&,C%#,)%#,O-!O-(!O3!#4()(!/\$)#!;(!#4(!O=(-,-8!\$=!O3!#4(!)(6#O&!#O!#4(!=&,C%#(!)(6#O&!!

L%6(1!<,#4!#4(!4%&)4!&(%7,#:!03!%!70-80)#%-1,-8!=0<(&!6&,),)!%-1!%!60-#,-\$(1!&(7,%-6(!0-!30)),7!3\$(7)!V60%7W*!9-1,%!-((1)!\%!\&\%1,6\%7!-(<!\%==\&0\%64>!O!#(64-0708,6\%7!\&(C07\$\#,0-!,-!#4(!)(6\#0\&! $\begin{aligned} & Q-!\%7\&(\%1:!;\%1!),\#\%\%\#, 0-!, -!\#4(!=0<(\&!)(6\#0\&!4\%)!60-\#, -\%(1!\#0!1(\#(\&,0\&)\#(>!_,\#4!\%-!\%;\$-1\%-6(!\\ O3! (C,1(-6(!\%C\%,7\%;7(!\#0!))40<!\#4(!6\&\&(-\#1,-3\&))\#\&\&6\#\&(!,)!-0\#13,\#130\&!=\&\&=0)(>!_,\#4!\#4(!\\ (/(\&\&(-6(!O3!-(<!\#(64-0708,()*!1(67,-,-8!60)\#)!\%)!,-!)O7\%\&W*!,--OC\%\#,C(!\#(64-0708,6\%7!60/;,-,\%\#,0-)*!\%-1!O#4(\&!60\$-4\&,()!/\%,-&\&!,/)=\&OC(/(-\#)!\%0!,-&\&(\%)(!\#4(,\&!O<-!7(C(7)!O3!(7(6\#\&,3,6\%\#,0-*!9-1,\%)!\%)!,-!)(\%7(0))=O\&\#\$-,\#:!\#0!;\$,71!\%-(<!7(6\#\&,6,\#:!,-3\&))#\&\&6\#\&\&(!,-!/\%-:!\&()=(6\#)!\%-1!;(8,-!\#4(!=\&O6())!\#0!3,-1!)O7\%\#,0-)!,-!(\%\&-()\#!\#0!,\#)!(-1(/,6!=\&0;7(/))!?4(!\#(64-0708,6\%7!\&(C07\%\#,0-!#4\%\#!4\%)!)<(=\#4\&0\&84!#4(!#(7(60//\$-,6\%\#,0-)!))(6\#0\&!OC(\&!#4(!7\%)\#1G^{!})!))<(:(\%\&)!=\&OC,1()!#4(!=O<(\&!,-1\$)#\&:!<,\#4!)O/(!C(\&:!\$)(3$7!7())O-)>!'\&,0\&!#0!#4(!%1C(-\#103!/0;,7(!=40-()!,-8!60))!))=(1,-2)(\%),0,0)=0.5\%,0,0-!,-!!&(C(70,-8!60))=:(...,*40,*#1,0)!) <(...,*40,*#1,0)!) <(...,*41,0)=(...,*7(!#0!,-1,-1)) <(...,*1,0)=:(...,*1,0)=(...,*1,0))=(...,*1,0)=($

 $1(C(70 = / (-#)!Q!NC,), 0 - !03!#4(!3$#$&(M!6\% - !; (!30$-1!, -!#4(!. \% -,)4!,)7\% - 1!03!"\% /)0! < 4,64!,)!#4(! < 0&71M)! 3,&)#! GFF a !)(730)$33,6,(-#!,)7\% - 1! ;%)(1! 0 - !&(-(<\%;7(! (-(&8:>! ?4(!,)7\% - 1! 8(#)!, #)! (7(6#&,6,#: !=&(10 / ,-\% - #7: !3&0 / !#4(!GG!0 -)40&(!\% - 1!GF!033)40&(!<, -1!#$&;, -()*! < 4,64!8(-(&%#(! %)!#0#\%7!03!])! / (8\% < \% =)!)! U: !EF]F!#4(!,)7\% - 1!%, /)!#0!; (!60 / =7(#(7: !3&((!03!\% - :!30& / !03!30)),7! 3$(7)!V0,7*!60%7!% - 1!8%)W!VN / 0 ? 2$G& >$-\%: K2&E+-21&LMMN&;,), HOO%, &(), -*6&B$H, -, :&P2WO): &+2&O&F, O''$)&'$'$-&! 5210+)OO%, &=$? ? 5)+1+, 2M*!G!Z\%: !EFG\W>!?0!1(C(70=!%!70<!6%&; 0 - !(60-0 / :!9 - 1,%!)))$

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= 4% # (C(&! # 4(!=&0;7(/)!# 4% #!/%:!/% #(&,%7,)(!,-!# 4(!3% # &(*!# 4(!Dhh'Z!,)!#()#,/0-:!# 0!# 4(!3% 6#!))))

 $= \% # 4 < \% : !\% - 1!0 - (!#4\% #!,)!)#,77!\%!70 - 8! < \% : !033!0C(\&!#4(!40\&,X0 - *!; \$#!#4(!),8 -)!03!,#!1(C(70=, -8!\%\&(! \%7\&))) \\ \% The the state is the stat$

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 $\begin{aligned} & LO\&! / O\&(!\#4\% - !\# < O!1(6\%1()!9 - 1,\%!4\%)!; ((-!\%\#(/=\#, -8!\#0!N3,BM!,\#)!1(6\&(=,\#!(7(6\#\&, 6,\#:!):)\#(/>!9\#! - O<!)\#\% - 1)!\%\#!\%!6\&O))\&O\%1)! < 4(\&(!,\#!4\%)!\% - O\#4(\&!O==O\&\#\$ - ,\#:!#O!\&(1((/!#4(!),\#\$\%\#, O - !\%33O\&1(1!\#O!),\#!;:!#4(!O==O\&\#\$ - ,\#, ()!=\&()(-\#(1!;:!\%! - (<!\#(64 - 0708,6\%7!\&(C07\$\#, O - >!?4,)!,)! < 4(\&(!9 - 1,\%!O\$84\#!),\#O!306\$)!#4(! / \%5O\&,\#:!O3!,\#)!\%\#(-\#, O - !\%)!#4,)!,)! < 4(\&(!#4(!3\$\#\&\&(!7,()*!\% - 1! < 4(\&(!O\#4(\&!60\$ - \#\&, ()!),\%))!))! \\ & \%\&(!\%7)O!4(\%1, -8!\%)!#4(:!)((A!\#O!;\$,71!\#4(,\&!O < -!7O < !6\%\&; O - !)))! \end{aligned}$

 $/ (8\% < \%\#) > !Q, \&!60 - 1, \#, 0 - , -8*!3\% -)!\% - 1!6, \#: ! < \%\#(\&!=\$ / =)!\%77!3\%, 7(1)! ' (0=7(!\% - 8\&: !\%\#!\#4(!), \#\$\%\#, 0 - !)) (\#!3, \&(!\#0!(7(6\#\&, 6, \#: !)\$;)\#\%\#, 0 -)!\% - 1!(C(-!\#00A!=0 < (\&!033, 6, \%7)!40)\#\%8(!VNP): +0)2\&; +\$1\& Y8, -\& B\$H, -\&=512\&I5 - +) *\&@, Ol\& > 08, K*!I!D\$ - (!EFG \W)!!!!!!!$

 $TC(-! / 0\&(!\% / ;, #, 0\$)7: *! Z 01, !4\%)! = \&0 / ,)(1!#4\%!(C(\&: !40\$)(4071! < ,77!4\%C(!\%!?7(\%)#!0-(!)07\%\&! 7,84#!; :!EFEF!\%)! = \%\&#!03!#4(!N)\%33\&0 - !\&(C07$#,0-\b!?4(!80C(\&- / (-#!,)!A((-!#0!$)(!#4(!7())0-)!7(%\&-#!3\&0 / !#4(!)$66())3$7!1(C(70= / (-#!03!)07\%\&!=0<(\&!, -!R$5%\&\%#!\% - 1!\%==7: !#4(/ ! / 0\&(!<,1(7: !\%6\&0))!#4(!60$-#\&:>!9-!#4(!&(6(-#!;$18(#!)=((64!#4(!3, -\% - 6(! / , - ,)#(\&!Q\&\$ - !D\%, #7(: !)0$84#!#0!8,C(!\%6\&0))!#4(!60$-#\&:>!9-!#4(!&(6(-#!;$18(#!)=((64!#4(!3, -\% - 6(! / , - ,)#(\&!Q\&\$ - !D\%, #7(: !)0$84#!#0!8,C(!\%1(1, -))?%\&!=0<(\&!)?% + (100)?%\&!=0<(\&!)(##, - 8!\%),1(!c)!^{FF!6\&0\&(!30\&!1C(70=, -8!30$\&!$7#\&\%0 / (8\%!)07\%\&!=0<(\&!))?% + (200)?% + (20$

 $9-1,\%! \quad 1(\&,C(1! 4\$8(! ; (-(3,#)! 3\&0 / ! #4(! #(64-0708,6\%7! \&(C07\$#,0-! #4\%#!)<(=#! #4\&0\$84! #(7(60 / / \$-,6\%#,0-))!P,A(<,)(*!#4(\&(!,)!-0#4,-8!#0!)#0=!,#!3\&0 / !#\%A,-8!\%1C\%-#\%8(!03!\%!), / ,7\%\&! #:=(!03!\&(C07\$#,0-!,-!(7(6#\&,6,#:>!9-1,\%!4\%)!-0!#, / (!#0!70)(>!$

^I*!]IE0]`]&&

U4%##%64%&::%*!" f !VEFFHW!NT-(&8:!%66())!=&O;7(/ !O3!#4(!=00&!,-!9-1,%d!9)!&\$&%7!(7(6#&,3,6%#,O-!

! "#"\$"%&"'(

 $Z - ((\&^{*}! ?)^{*}!Q), 3^{*}!Z^{*}!Z - \% < (\&^{*}!"!VEFF^{W!N"}) \#\%, -\%; 7(!=\&01\$6\#, 0-!03!)07\%\&!(7(6\#\&, 6, \#:!<, \#4!)) = (\&^{*}, 6\$7\%\&!\&(3(\&(-6(!\#0!\#4(!9-1, \%-!(60-0/:M^{*}!;,), HOO\%, \&O):\&!5210+)OO\%, \&(), -*6\&;, 8+, H2^{*}!S^{*}!)) + (0|I]!$

h 0\$ - ,*! Z c >*! Z \$77, 6A*! " f >* Y% - 1 = %7*!? f !VEFF` W!N' & 0C, 1, -8!(7(6#&, 6, #:!%66())!, -!&(/ 0#(!%&(%)!, -! 9-1, %d!Q - !% == & 0%64! # 0 < %& 1)!, 1(-#, 3:, -8! = 0#(-#, %7! %&(%)! 30&! 1(6(-#&%7,)(1!(7(6#&, 6, #:!))\$ == 7: M*!))))

__,77,% /)*! D [>*! . \$;%)4*! h Y! VEFF\W! NQ),% -! T7(6#&,6,#:! c (30& / !, -! [,)#O&,6%7! '(&)=(6#,C(M*! BO''+'+''&A''O+-2*!+O7!II*!hO!]*!\GG0\]H!

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) %*+%"(,-.\$&""(

/9-1,%! Z\$)#! "=(-1! jE^F!;,77,0-!;:!EFGS!#0! Z((#!9#)! '0<(&! h((1)d! f%)4!370<!,)!5\$)#!=%&#!03! 9-1,%M)!(7(6#&,6,#:!=&0;7(/ M*!!

 $\frac{4\#\#=dll < <<>8\&((-\#(64 / (1,\%)60 / 1\%\&\#,67())\&(\%119 - 1,\%0Z\$)\#0"=(-10E^{FU0}; :0EFGS0\#00Z((\#09\#)0)))}{'0 < (\&0h((1)i\$\#/0)0\$\&6(q"07\%\&!V\%66())(1!\% - 1!64(6A(1!GI!h0C(/;(\&!EFG\backslash W!)))))}$

 $\begin{aligned} & \text{N9-1,\%!} \quad & \text{'7(18()!} \quad \text{jE^F!} \quad \text{Z,77,0-!} \quad & \text{#0!} \quad \text{R\&,1!} \quad \text{9/=\&OC(/(-#)^*!} \quad & \text{'0<(\&M^*!)} \\ & \text{4#=dll)=(6\#\&\$/>,(((>0\&81(-(\&8:<,)(1(-(\&8:1\#4(0)/\&!\&!(\&08\&,11,-1,\%0=7(18())0E^F0/,77,0-0\#00))))))))) \\ & \text{(a)} \quad \text{(a)} \quad \text{(b)} \quad \text{(b)} \quad \text{(c)} \quad$

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Nc 06A)! ,-! 9-1,%! f 0%7! " $==7:! Z(\%-)! Z 0\&(! '0<(\&\& U7\%6A0$#)Md! T-(\&8:*! *! 4#=d11<<<;700/;(\&8>60/1-(<)1EFG]0F^0FG1\&06A)0,-0,-1,%060%70)$==7:0/(\%-)0/0\&($