#\$%%&#\$'\$(")&\*+,"

" - ./0"1201.2034""56!7689

```
( 03FI.<"LIJ::<0" ( .DD.IJGD0//D"O0;02.<"R:D1F/.<"
        !Z7!"
                               BDHIJ: <: KH" + DDFD/.; /@"A: D/:; "L/./O"R: D1F/.<"
        !Z7!N!Z78"
                               BDHIJ:<: KH"&; /02; @"#. EY2F3K0"OGF3.; I0"#0; /02"
        !Z78"
                               BDHIJ:<: KH"*2.F; 000") 0/02.; bD"+3EF; FD/2./F:; "QG/1./F0; /"#<F; FI0"
                               A:D/:;"
    =$.$''-)4*>$001?.4(<.\%*
        !Z[5"
                               $>L>"BGY\FI"R0.\(\forall J"L02?\FI0"=0\times: MDJF1"C:2"\(\forall 0 D0.2IJ"F: "BDHIJF./2H"
                               $>L>"BGY<FI"R0.</J"L02?FI0"=0<<: MDJF1"C:2"%0D0.2IJ"F; ""
        !Z[["
                               BDHIJ:1J.2E.I:<:KH"
        !ZaT"
                               %ODO.2IJ"+DD:IF./0@"#0;/02"C:2"%ODO.2IJ":;"X:E0;@"XO<OD<OH"
                               #:<<0K0"
*****@()$7.6-$*"7,*A$-3('()"3(17\%
        !Z75"
                                'FIO;DG20"YH"A:.23":C"%OKFD/2./F:;":C"BDHIJ:<:KFD/D@"
                                ( .DD.IJGDO//D"]%0/F203^"
        !Z7["
                               #02/FCFI./F:;"YH"#:G;IF<"C:2"/J0"V./F:;.<"%0KFD/02":C"R0.</J"
                               L02?FI0"B2: ?F302D"F; "BDHIJ:<:KH""
        !Z7a"
                               'FIO;DG20"YH"A:.23":C" ( 03FI.<"cG.<F/H"+DDG2.;I0"]BDHIJ:<:KH^@"
                               # .<FC:2;F.>"]&; .I/F?O^"
        !Za!"
                               - F1<: E ./0"F;" ( .2F/.<" .; 3"= . EF<H"*J02.1H@"+E02FI .; "A : .23" : C"
                               = EF<H"BDHIJ:<:KH""
        !Zaa"
                               - F1<: E./O"F; "#<F; FI.<"BDHIJ:<: KH@" + E02FI.; "A:.23": C"B2: CODDF:; .<"
                               BDHIJ: <: KH""
        !ZZZ
                                'FIO;DG20"YH" - F?FDF:;":C" ( 03FI.<"cG.<F/H"+DDG2.;I0"]BDHIJ:<:KH^@"
                               =<: 2F3 .>"]%0/F203^"
        8TT8
                               - F1<: E./0"F;"#:G1<0".;3"=. EF<H"BDHIJ:<: KH@"+E02FI.;"A:.23":C"
                               B2:CODDF::.<"BDHIJ:<:KH"
       8TTa
                                'FIO;DG20"YH"QJF:"L/./0"A:.23":C"BDHIJ:<:KH"
****+)",$#()*+<<1(73#$73.4"
        !Z7TN!Z7!"
                               *0.IJF;K"=0<: M@" - 01.2/E0;/": C"L: IF.<"%0<./F:;D@"R.2?.23"
                               $:F?02DF/H""
        !Z79N!Z75"
                               +DD: IF./O"B2:CODD: 20" - O1.2/E0;/":C"BDHIJ:<:KH0"A:D/:;"L/./O"
```

#:<0K0""

+ DD: IF./0"F;", 3GI./F:; @"R.2?.23"\$; F?02DF/H"!Z79N!Z75"

+ DDFD/.; /"B2:CODD: 20"B2: K2. E"F; "#:G; DO < F; K"BDHIJ: <: KH0"A:D/:; "!Z75N!ZaS"

\$;F?O2DF/H"

 $\# \langle \texttt{F}; \texttt{FI}. \langle \texttt{"} + \texttt{DD} : \texttt{IF}. / \texttt{0"B2} : \texttt{CODD} : \texttt{20"B2} : \texttt{K2}. \ \texttt{E"F}; \texttt{"} \# : \texttt{G}; \texttt{DO} \langle \texttt{F}; \texttt{K"BDHIJ} : \langle : \texttt{KH0"} | \texttt{KH0"} \rangle = \texttt{CODD} : \texttt{CODD} : \texttt{20"B2} : \texttt{K2}. \ \texttt{E"F}; \texttt{FI} = \texttt{CCDD} : \texttt{CODD} :$ !ZaSN!Zaa"

A:D/:;"\$;F?O2DF/H"

 $+ DD: IF./0"B2:CODD: 2"]MF/J"/0; G20^@"B2: K2. E"F; "\#:G; DO \!\!\!<\!\!\!F; K"BDHIJ: <: KH"F; "/J0"LIJ: : <":C", 3GI./F:; ".; 3"/J0"$ !ZaaN!ZZT"

C. EF<br/>H"/J02.1H"C:2".3:<0DIO;/".;3".3G</"1DHIJF./2FI"F;1./FO;/D>""

!Z75N!Z77"

#:;DG</F;K"#<F;FI.<"BDHIJ:<:KFD/@"(.DD.IJGDO//D"%OJ.YF<F/./F:;"

#: E EFDDF: ;>"B2: ?F303"1DHIJ:3F.K;:D/FI"0?.<G./F:;D>"

"

!Z75N!ZaS" #\F;FI.\\(\bar{F}\)!Z301.\\(\frac{2}{10}\);\(\

&;D/F/G/0@"A:D/:;>"B2:?F303"1DHIJ:3F.K;:D/FI"0?.<G./F:;D@"

F;3F?F3G.<@"K2:G1@"I:G1<OD".;3"C.EF<H"/J02.1H"C:2".3:<0DI0;/D".;3"

.3G</D"2010;/<H"3FDIJ.2K03"C2: E"/J0"J:D1F/.</Ti>

!ZaSN!ZZ7"

&;3010;30;/"B2.I/FI0"]1.2/N/FE0"!ZaSN!ZZT@"CG<N/FE0"!ZZTN!ZZ7^>"

+"K0;02.<"I<F;FI.<"12. I/FIO"C: IGDF; K":; "E0; @"12: ?F3F; K"

1DHIJ:3F.K;:D/FI"0?.<G./F:;D@F;3F?F3G.<@"K2:G1@"I:G1<OD".;3"
C.EF<H"/J02.1H>"&"30?0<:103".;".112:.IJ"30DFK;03"C:2"E0;"C:2"."
?.2F0/H":C"120D0;/F;K"12:Y<OED"F;I<G3F;K".;dF0/H@"30120DDF:;@"
.<I:J:<"12:Y<OED@"D0dG.<"3HDCG;I/F:;D@"M:2P"D/20DD@"1DHIJ:<:KFI.<"

I:E1\FI.\F:;D":C"1JHDFI.\"F\(\circ\;0DD\(\theta\)".;3"E.2F\.\\".;3"C.EF\\"12:Y\(\theta\)ED\"

## A0(7()"0\*C6<\$-D(.1-E\*5B<\$-(\$7)\$%

!Z79N!Z75

!Z7SN!Z79" - F20I/: 20"%: Y02/"X>"XJF/0"LIJ:: <0".2FIJ" 'F: 30E.:: "(0:/.<" R0.</J"#0;/02>", d0IG/F?0"20D1:;DFYF<F/H"C:2"."/J02.10G/FI"3.H" DIJ::<"C:2"D0?020<H"3FD/G2Y03".;3"30<F;fG0;/".3:<0DI0;/D>"  $- \verb|F20I/:20||'/J0|| = ./J02J::3"B2: \verb|U0I/0||'A:D/:;"$; F?02DF/H>" - ODFK:03".:3"$ !ZaSN!Zaa" 3F20I/03".";./F:;.«H"20;:M;03"120?0;/F?0":G/20.IJ"12:K2.E"/J./" 30?0<: 103".; 3"0?. <G./03"1DHIJ: 03GI./F:; .<"12: K2. ED"C: 2"C./J02D" .;3"/J0F2"C.EF<F0D>" - 0DFK;03"12:K2.ED@"/2.F;03".;3"DG102?FD03" K2:G1"<0.302D>" !ZZ7N8TT5" - 0.; @"#0; /02"C: 2"BDHIJ: <: KFI. <"L/G3F0D@"V: ?. "L: G/J0.D/02;" \$:F?02DF/H>""VL\$@"<:I./03"F:"=/>" '.G3023.<0@"= '@"FD".:"F:3010:30:/@" ;:/NC:2N12:CF/"F;D/F/G/F:;"I<.DDFCFO3"F;"/JO"#.2;OKFO"#<.DDFCFI./F:;":C" + E 02FI.; "RFKJ02", 3GI./F:; ".D"."3:I/:2.<620D0.2IJ"F;/0;DF?0" G;F?02DF/H>"&/"Y0K.;"F;"!Z[9".;3"Y0I.E0"/J0"a!""<.2K0D/"F;3010;30;/" G;F?O2DF/H"F;"/JO"\$;F/O3"L/./OD>"\*JO"#0;/O2"C:2"BDHIJ:<:KFI.<" L/G3FOD"]#BL^"FD"D: EOMJ./"G;GDG.<@"I:;DFD/F;K":C"."K2.3G./O" DIJ::<":C"1DHIJ:<:KH"MF/J":?02"!9TT"D/G30;/D".;3"."BDHIJ:<:KH" L02?FI0D"#0;/02"]BL#^"D02?F;K"1./F0;/D"/J2:GKJ:G/"L:G/J"=<:2F3.>" VL\$"FD"30I0;/2.<Fg03".;3"30.;D".20"20D1:;DFY<0"C:2"/J0F2":M;" YG3K0/D>"\*J0": ?02.<("I:EYF;03"YG3K0/":C"/J0"LIJ::<".;3"/J0"BL#" M.D''/J0;".112:dFE./0<H"h!["EF<<F:;>"8TT5N8TTZ" - 0.; @"AGIJ/O<"#: <<OKO": C"+2/D".; 3"LIFO; IOD@"\*JO"\$; F?02DF/H": C" +P2:;>"\*J0"\$;F?02DF/H":C"+P2:;"FD".;"G2Y.;"G;F?02DF/H":C" .112:dFE./0<H"85@TTT"D/G30;/D>"#<.DDFCF03".D"."iLE.<<"%0D0.2IJ" \$;F?O2DF/Hj"G;302"/J0"#.2;OKFO"LHD/OE@"F/"FD"2.;PO3"C:G2/J".E:;K" .<"QJF:"\$;F?02DF/F0D"F;"/J0"20D0.2IJ"12:3GI/F?F/H":C"F/D"C.IG</H"YH" +I.30EFI"+;.<h/FID@".;3"F;"8T!5"C:G2/J"F;"%0D0.2IJ",d10;3F/G20D>"" \*J0"AGIJ/0<"#: <<0K0": C"+2/D".; 3"LIF0; I0D"FD"/J0": <30D/"]! a7T^".; 3" <.2KOD/"I:<<0K0@"K0;02./F;K"/J0;".Y:G/"95 k":C".<<"D/G30;/"I203F/" J:G2D"/.GKJ/"F;"/J0"0;/F20"G;F?02DF/H>" (H"3F20I/"201:2/D"F;I<G303"!a" 301.2/E0;/"IJ.F2D@"S".DD:IF./O"30.;D".;3"!8"F;D/F/G/O".;3"I0;/02" 3F20I/:2D>" ( H"YG3K0/"]0d10; D0D":; <H^"M.D":?02"hS! ( "./"/J./"/FE0>""  $\mathbf{F1.} < (3''0^* + << 1(73 \# \$73.\%'')$ \*20./E0;/"\*0.E" '0.3020"&;1./F0;/"\$;F/0"RGE.;"%0D:G2I0"&;D/F/G/0" !Z79N!Z75" :C"A:D/:;" !Z79N!ZaS" #:;DG</F;K"#<F;FI.<"BDHIJ:<:KFD/".;3"Q2K.;Fg./F:;.<"#:;DG</.;/@" RGE: "%0D:G2IO"&;D/F/G/O":C"A:D/:;" !ZZTN!ZZ7" #<F;FI.<"LG102?FD: 20"\*J0"#: G1<0D".;3"=. EF<H"#0;/020"#. EY2F3K0" R:D1F/.<"

#:G2/ODH"+11:F;/E0;/@"+<<F03"R0.</J"B2:CODDF:;..@"-01.2/E0;/":C"

BDHIJF./2H@"#J:./O"RO.</J"LHD/OED@"&;I>"

!ZZSN!ZZ7"

!ZZ["

```
BDHIJ:<:KH"
                8T!!"
                                                                   + E O2FI .; "BDHI J : < : KFI . <" + DD : IF . /F :; " + M . 23 "C : 2" - FD/F; KGFD J O3"
                                                                   B2:CODDF:;.<"#:;/2FYG/F:;D"/:"+11<F03"%0D0.2IJ"
                8T!9"
                                                                   + E O2FI .; "BDHI J : <: KFI . <" + DD : IF . /F :; > "B20DF30; /F . <" #F/ . /F :; 4" i &; "
                                                                   20I:K;F/F:;":C"JFD"?FDF:;.2H"<0.302DJF1".;3"0dI01/F:;.<"D02?FI0"/:"
                                                                   ! "#$%&'&(#)&*)+,-).-/)+. "$O'1-12#3"$;302"JFD"KGF3.; IO@"/JO"
                                                                  U:G2;.<"20.IJ03"0d/2.:23F;.2H"?FDFYF<F/H".;3"FE1.I/@"E.PF;K"F/"."
                                                                   DIJ:<.2<H"/2.F<"Y<.g02"C:2"D:IF.<"UGD/FIO".;3"OfG.<F/H>j"
                8T!5"
                                                                   + < 203" (> X 0 < 92" FC0/FE0" + IJF0 ?0E0; /" + M.23""
                                                                   O:\langle 30; "`OH"\&;/02;./F:;.\langle "R:;:G2"L:IFO/H@"R:;:2.2H" ( 0EY02>"
                8T!["
        """""8T!a"
                                                                   + E O2FI .; "BDHI J : < : KFI . <" + DD : IF . /F : ; @"L : IFO/H"C : 2"/JO"
                                                                   BDHIJ:<: KFI.<"L/G3H":C" (0;".;3" (.DIG<F;F/FOD"] - F?FDF:;"5!^@"
                                                                   B20DF30;/F.<"#F/./F:;"C:2"QG/D/.;3F;K"L02?FI0>""
                8T8T"
                                                                   \%:D. FO"O>"XOFDD" OI/G20"+M.23"D1:;D:203"YH"/JO"+E02FI.;"
                                                                   BDHIJ:<:KFI.<"=:G;3./F:;".;3"-F?FDF:;"8Z".;3"98":C"+B+>"
                                                                   +M.2303"C: 2"/J0"Y:: P@4%, )4&0(%)52. -/.6/7)4%, )8.6/)4602%")
                                                                   .9\&02) + ."\$0'1-12\#). -/):1\&', -\$,>"
                8T8T"
                                                                   %0D0.2IJ02": C"/J0"e0.2"+M.23@"L: IF0/H"C: 2"/J0"BDHIJ: <: KFI.<"L/G3H"
                                                                   : C" (0;".;3" (.DIG<F;F/FOD@" - F?FDF:;"5!":C"+B+>"#:N.M.2303"MF/J")
                                                                  LJ.; ."B2H:2"C:2":G2"Y::P@4%,)4&O(%)52.-/.6/7)4%,)8.6/)4602%")
                                                                   . 9&02) + . "$0'1-12#). -/):1&', -$,>"
"""""8T8!"
                                                                   XF < F. E = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.50 = 0.
                                                                   +B+0"#: N.M.2303"MF/J"LJ.;."B2H:2"C:2":G2"Y::P0"4%,)4&0(%)
                                                                   52. -/. 6/7)4%, )8.6/)4602%"). 9&02)+. "$0'1-12#). -/): 1&', -$,>"
                8T8S"
                                                                    'FCO/FEO"+IJFO?0E0;/"+M.23@"QJF:"BDHIJ:<:KFI.<"+DD:IF./F:;>""
G$#H$-.4(<.I*&''()$.I*''7,*A1##(33$$*+..(97#$73.*(7*/.E)41019()''0*+..1)(''3(17.\%
                                                                   + E02FI.; "Q2/J:1DHIJF./2FI"+DD:IF./F:; "]=0<:M^"
                 !Z79NT5"
                 !Z79NT5"
                                                                   VOM",; K<.; 3"BDHIJ:<: KFI.<"+DD: IF./F:;>"
```

 $\underline{QCCFI0D".;3"+11:F;/E0;/D"R0<3"F;"+}B+4"$ 

V0/M:2P" (  $0\,E\,Y02\ell"AB + "LGYI:E\,E\,F//00":;"=G/G20"$  (  $.2P0/D\ell"$  !  $Za\,SNa\,5>"$ 

 $(\ 0 E Y 0 2 \ell'' \ ' \ F. FD: ; 6\#: ; DG \! \checkmark . /F: ; "O2: G1 \ell'' \#: E E F \! / \! / \! 00"C: 2" \! / \! J0"$ 

```
#: N#J.F2@"B2ODF3O; /F.<" (F; FI:; ?0; /F:; @"iB2ODI2F1/F?O"+G/J:2F/H"C:2"
BDHIJ:<: KFD/D@j"8TTT"
\#: \texttt{N"} \# \texttt{J} . \texttt{F20"} + \texttt{B} + \texttt{"} \# : \texttt{E} \ \texttt{EFDDF} : \texttt{;"} : \texttt{;"} , 3 \texttt{GI} . / \texttt{F} : \texttt{;"} . \texttt{;} 3 \texttt{"*2.F} ; \texttt{F} ; \texttt{K"} \texttt{'0.3F} ; \texttt{K"} 
/:"'FIO;DG20"F;"BDHIJ:<:KH@"8TTT"
#:N#J.F2@"A:.23":C"-F20I/:2D"*.DP"=:2I0":;"#:G;IF<"
%0120D0;/./F:;"&&@"8TTTN8TT!>"
#:N#J.F2@"A:.23":C"-F20I/:2D"*.DP"=:2I0":;"B2:CODDF:;.<"+M.23D@"
8TTTN8TT!"
+B+"%0120D0;/./F?0"/: "X JF/0"R:GD0"LGE EF/":; " ( 0;/.<"R0.\checkmark/J":C"
#JF<320; @" ( .2IJ@"8TTT"
+B+"%0120D0;/./F?0"/:"LG2K0:;"O0;02.<ID"#:;C020;I0":;"(0;/.<"
R0.</J":C"#JF<320;@"QI/:Y02@"8TTT"
#J.F20"A:.23":C"-F20I/:2D"*.DP"=:2I0":;"-FD/.;I0",3GI./F:;"F;"
B2:CODDF:;.<"BDHIJ:<:KH@"8TT!NT8"
(\ 0EY02 \ "A:.23": C"-F20I/: 2D"X: 2PF; K"O2: G1": ; "/J0"+E02FI. ; "
BDHIJ:<: KFD/@"8TT!"
#J.F2@"A:.23":C"-F20I/:2D"*.DP"=:2IO":;"BDHIJ:<:KHID"%0D1:;D0"/:"
*022:2FDE@"8TT!NT8"
#J.F20"+B+".;3"+E02FI.; "BDHIJ:<:KFI.<"=:G;3./F:; "*.DP"=:2I0"
:; "B2: E:/F; K"%ODF<F0; IO"F; "%OD1:; DO"/: "*O22: 2FDE@"8TT8N
```

```
#J.F2@"Q2K.;Fg./F:;.<"-0?0<:1E0;/@"(.2P0/F;K@".;3"B02D:;;0<"
                             #: E EF//00D@"!ZaSNa5>"
                             B20DF30;/N, <0I/@"!Za5N!Za7_"B20DF30;/"!Za7N!ZaZ_"B.D/"B20DF30;/@"
                             !ZaZNZT_"
                             ( OEYO2@", dOIG/F?O"#: EEF//OO@"!Za5NZT "#J.F2@"+M.23D"
                             #: E EF//000"!Za5Na[0"!Za[Na70"!ZaZNZT>"
                             #J.F20"':;K"%.;K0"B<.;;F;K"#:EEF//000"!ZaaNaZ>"
       !ZZZN8TT5"
                             =<: 2F3. "BDHIJ:<: KFI.<"+DD: IF./F:; "]E0EY02^"
                             #J.F24"#: EEF//00":;"/J0"BDHIJ:<:KH":C"(0;@"!ZZZN8TTT""
       !Z75N!Za["
                            L: IFO/H"C: 2"BDHIJ:/J02.1H"%0D0.2IJ"
       !Z7[N!Za!"
                             +1.30EH":C"BDHIJ:<:KFD/D"F;"(.2F/.<".;3"=.EF<H"*J02.1H"]=0<:M^"
       !Z77N8TT5"
                            &;/02;./F:;.<"+DD:IF./F:;":C"+11<F03"BDHIJ:<:KH""
                             + E O2FI.;"+DD:IF./F:;"C:2"(.22F.KO".;3"=.EF\H"*JO2.1H"]#\F;FI.<"
       !ZaTN"
                             (0EY02@"=0 <: M^"
       !Za8\\8\TT5\"
                             V./F: ; .<"\#:G; IF<": ; "=. EF<H"%0<./F: ; D"
                             +E02FI.; "=.EKH"*J02.1H"+DD:IF./F:;"
       !Za8N8TT5"
                             8TT!N8TT84"#J.F2@"#<F;FI.<"%ODO.2IJ"#:;CO20;IO"
       !ZZ!N8TT5"
                            \&;/02;./F::..."+I.30EH":C"=.EF<H"BDHIJ:<:KH"
       8TT5N"
                             QJF: "BDHIJ:<: KFI.<"+DD: IF./F:;""
&34$-*A1##(33$$*+..(97#$73.\\"
   A1##17?$"034*1'*G"..")46.$33.\/
       !ZZ!"
```

```
8TT7N8T!5"
                              + E02FI.; "BDHIJ: <: KFI. <"=:G;3./F:;>"
5, (31-("0*+..(97 # $73.\%*
   5,(31-("0*21"-,.%"
       !Za!N"
                              + E O2FI .; "m:G2; .<":C"=. EF<H"*JO2.1H@"+3?FD:2H", 3F/:2"
       !Za8N8T!["
                              m:G2; ... ":C" (.22F.K0".; 3"=.EF.H"*J02.1H@"+3?FD:2H", 3F/:2"
       !ZaSN!Za["
                              = .EF < H'' < 0 < ./F : ;D@'' + DD : IF ./O'', 3F/:2''
       !Za5N!ZZ8@"!ZZaN"
                              m:G2; .<":C"=.EF<H"BDHIJ:<:KH@"+3?FD:2H",3F/:2"
       !Za[N!ZZa"
                              BDHIJ:/JO2.1H@", 3F/:2F.<"#:;DG</.;/"
                               (DIG<F;F/FOD@"+DD:IF./O",3F/:2""
       !ZZ9N!ZZ7"
       !ZZ[N8TT8@"8TT[NTa" B2:CODDF:;.<"BDHIJ:<:KH4"%0D0.2IJ".;3"B2.I/FI0@"#:;DG</F;K",3F/:2"
                              m:G2; .. < ":C"O0; 3020" #G < /G200" ..; 3"R0. < /J0" + 3?FD: 2H", 3F/: 2>"
       !ZZ[N!ZZZ"
       !ZZaN8TT5"
                               (0;".;3" (.DIG < F;F/FOD @"+3?FD:2H",3F/:2")
       !ZZaN8TT7
                              BDHIJ:<: KH": C" (0;".;3" (.DIG<F;F/H0"#:;DG</F;K",3F/:2"
       !ZZaN8T![
                              m:G2;.<":C"+C2FI.;"+E02FI.;"L/G3F0D@"#:;DG</F;K",3F/:2"
       8TTTN8TT!5"
                              m:G2;.<":C"*2.GE."B2.I/FIO@"#:;DG</F;K",3F/:2"
       8TTTN8TTZ"
                              &;"LODDF:;4"BDHIJ:/JO2.1H"F;"B2.I/FIO"
       8TT8N8TT9
                              #\F;FI.\\'\\BDHIJ:\\\:KH4\'\LIFO;IO\'\.;3\'\\B2.I\/\FIO\'\
                              B2.KE./FI"#.D0"L/G3F0D"F; "BDHIJ:/J02.1H"
       8TT5N
                              BJ:0;Fd4"+"m:G2; .<":C"A<.IP" (0;1D"RFD/:2H@"#G</G20"L/G3F0D@".;3"
       8T!8N""
                              BGY&I"B:&IH"
                              B2.I/FIO"&;;:?./F:;D"
       8T!5N" "
       8T8!N" "
                              BDHIJ:<: KH": C" (0; ".; 3" (.DIG<F; F/FOD@"L0; F: 2", 3F/: 2F.<"A:.23"
                               *J0"m:G2;.<":C",E:/F:;".;3"BDHIJ:1./J:<:KH"
       8T89N" "
    J 6$.3*5, (31-.4(<.\"
                               *J0"#:G;D0<F;K"BDHIJ:<:KFD/@"!!]S^>"
       !ZaS"
```

!Za7" BDHIJ:/J02.1H0"89]8D^>"

!ZZT" BDHIJ:/J02.1H@87]S^"]L10IF.<"L02FOD^>"

 $!ZZ7" \\ m:G2; .<":C"+C2FI.;"+E02FI.;"(0;0"8]9^0"S]!^"]\#:NOG0D/", 3F/:2^"$ 

!ZZZ

```
!ZZ5N8TT5" X .DJF; K/:; "$13./0"#: <GE; @"*JO"&; 3010; 30; /"B2. I/F/F:; 02>"

!ZZ5N8TT5" B2. I/F/F:; 02"%01:2/"#: <GE; @"BDHIJ:/J02. 1H"AG<<0/F;>"

!ZZ5N!ZZ[" %0<./F:; DJF1"#: <GE; @" (:302; "-.3" (.K.gF; 0*

* +..1)("3$*5, (31-.4(<.\%*

* 8TT8N
```

#:;C020;I0D4"nQ;" ( 0;4"%030CF;F;K"%: <0Dn\_"nQ;" ( 0;n\_"n ( 0;".;3" X:E0;4"+"#<F;FI.<"-F.<: KG0n\_"nX:2PF;K"MF/J"#:G1<0D4"-FCC020;/"+112:.IJ0D\_n"n ( :/J02F;K".;3"=./J02F;K4"#<F;FI.<"#J.<0;K0Dn>"'0I/G203"F;"BDHIJF./2H"O2.;3"%:G;3D"./"#.EY2F3K0"R:D1F/.<0" ( :G;/"+GYG2;"R:D1F/.<0" ( I'0.;"R:D1F/.<0".;3"R.2?.23" \$;F?02DF/H"L/G30;/"R0.</J"L02?FI0D\_"BDHIJF./2H"#:G2D0"-F20I/:20" #.EY2F3K0"L02F0D"#:;C020;I00"n ( :/J02F;K".;3"=./J02F;K4"#<F;FI.<"#J.<0;K0Dj>"

8TTS"" " "

8TTZN"

"

2;2@;&J=+/FL"

A(3''3(17.\*''7, \*FM(7, \$B\*))

!68S689>"X0Y":C"LIF0; I04"8[Za"IF/./F:; D0"RNF; 30d"p"87

 $+,...''06,C,-2).-/)D;...'0.2l\&-)l-)E\&0-'','l-().-/)F,;,'\&GC,-23"BGY<\mathbb{P}J03":;<\mathbb{F};0>"\underline{J//1D4663}:\mathbb{F}:2K6!T>!TaT6T79a!75[>8T88>8![TS5[""]]$ 

 $(\text{ I - 02E : //@"\%>" #>@"A 2.DF<@"`> ( >@"A : 2K : K; ..@"V>" #>@"A .2F; .D@"m>" '>@" q " '0? . ; /@"%>"=>"]8T88@"mG<H"! [^>"" | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 |$ 

- $\begin{tabular}{ll} \begin{tabular}{ll} \be$

 $(0.DG20E0; /"F;?.2F.; I0"YH"2.I0"] A < .IP @ X JF / O^" : C" / J0" = 0 EF; F; F / H & 30 : < : KH" LI. < ON LJ: 2 / " = : 2 E > "$ 

QA@"S9ZNS59""

- %: K02D@"A>"`>@"L1022H@"R>"L>@"q"'0?.;/@"%>"=>"]8T!5^>" ( .DIG<F;F/F0D". E:;K"+C2FI.;"+E02FI.;" E0;4"+;"F;/02D01/F:;.."102D101/F?03)! "#\$%&'&(#)&\*)+,-).-/)+. "\$0'1-12#@QA@"9! [N985>"
- '0?.;/@"%>"=>@"X:;K@"e>"m>@"`2.PFD@",>"V>@"q"X0<IJ@"(>"X>"]8T!5^>"(:302./03"E03F./F:;":C"/J0"20<./F:;DJF1"Y0/M00;"/J0"0;3:2D0E0;/":C"20D/2FI/F?0"0E:/F:;.<F/H".;3".<0dF/JHEF.>
  ! "#\$%&'&(#)&\*)+,-).-/)+. "\$0'1-12#@)QA@"95ZN9[7>"
- $\label{eq:continuous} $$ '0?.;/0"\%>"=>0"R.<<0"%>"m>0"XOFK:<30"&>0"q" (I#G23H0",>"%>"]8T!5^>"#:;D/2GI/"-FD/F;I/F?0;ODD".;3" ).2F.;I0"#:E1:DF/F:;":C" (G</FN-FE0;DF:;.<"&;D/2GE0;/D4"*J200"LJ:2/N=:2E" (.DIG<F;F/H" (0.DG20D))P&O6-.')&*)E&O-'','1-()!''#$%&'&(#0)AM0"9aaN5T8>"""$

"

)

```
"#GOD/F:;OD"12:CODF:;.<OD"0;"<."1DFI:C.2E.I:/02.1F."1.2."1DFI:<:K:D"I,;1"2.)/,)

! "1$&2,6.Gl.@)AB@"!!N85>"

'0?:;/@"%>"=>@"O2.0C@"L>"*>@"LE.<OH@"`>"A>@"XF<F.ED@"#>@"q"(I(F<.;@"V>"]8TTa^>"*JO"0?.<G./F:;"

: C"/JO"(.<O"%:<O"V:2ED"&;?0;/:2HN+3:<ODIO;/"](%V&N+^>#4%#C&"7)P&O6-.')&*)[&#%&&/)

52O/l, "@)M@"9[N5Z"

'0?:;/@"%>"=>""]8TTa^>"*JO"8TT5"XJF/O"R:GDO"#:;CO2O;IO":;"+KF;K4"BDHIJ:<:KH".;3"/JO"+KF;K"

A::E02D>"!"#$%&'&(1$.')5,6;1$, "@)N@"Z9NZ[>"

'0?:;/@"%>"=>"]8TT7^>"R:M"3:"MO"G;302D/.;3"E.DIG<f;F/Ht"+;"03F/:2F.<"!"#$%&'&(#)&*)+,-).-/)

+."$O'1-12#@)B@"!N9>"

'0?:;/@"%>"=>@"%FIJE:;3@"`>@"#::P@"L@"R:GDO@"+>@"q"+G1:;/@"(>"]8TT7^>"*JO"=OEF;F;F/H"

&30:<:KH"LI.<O4"=.I/:2"D/2GI/G2O@"2O<F.YF<F/H@"?.<F3F/H@".;3"D:IF.<"I:;/Od/G.<"?.2F./F:;>"5,H)

I &', "@)NR@"S7SNSaS>"

X.E1:<3@"A>@"O::3JO.2/@"#>"q"'0?:;/@"%>"=>"]8TT7^>", ?F30;ION
```

```
5,6;1$, "@)K@"8a[N8a7>"
'0?.;/@"%>=>@"O::3@"O>", >@"#::P@"L>@"QIV0F\@"m>@"LE.\<\OH@"`>"A>@"QM0;@"`>"+>@"q"\\FIJE:;3@"`>"
             [8TT[^"]] . F3 ./F:; ": C"/J0"V:2E ./F?0" ( .<0"+<0dF/JHEF."LI .<04" ( 0.DG20E0;/": C" . "K0; 302N
             ⟨F; P03"DH; 32: E0⟩"!"#$%&'&(#)&*)+,-).-/)+."$0'1-12#0)R@"8!8N889>"
""""""""" J//1D4663:F>:2K6!T>!TS76!589NZ88T>7>9>8!8
A2:: PD ("O>"\%>" q"'O?.; /("\%>"=>"] STT [^>""\&D") F. K2. "O; : GKJ4"A2:..30; F; K"/J0" < 0; D"F; "D0d"/J02.1H" > ("O") | F. K2. "O"; : GKJ4"A2:..30; F; K"/J0" < 0; D"F; "D0d"/J02.1H" | F. K2. "O"; : GKJ4"A2:..30; F; K"/J0" < 0; D"F; "D0d"/J02.1H" | F. K2. "O"; : GKJ4"A2:..30; F; K"/J0" < 0; D"F; "D0d"/J02.1H" | F. K2. "O"; : GKJ4"A2:..30; F; K"/J0" < 0; D"F; "D0d"/J02.1H" | F. K2. "O"; : GKJ4"A2:..30; F; K"/J0" < 0; D"F; "D0d"/J02.1H" | F. K2. "O"; : GKJ4"A2:..30; F; K"/J0" < 0; D"F; "D0d"/J02.1H" | F. K2. "O"; : GKJ4"A2:..30; F; K"/J0" < 0; D"F; "D0d"/J02.1H" | F. K2. "O"; : GKJ4"A2:..30; F; K"/J0" < 0; D"F; "D0d"/J02.1H" | F. K2. "O"; : GKJ4"A2:..30; F; K"/J0" < 0; D"F; "D0d"/J02.1H" | F. K2. "O"; D"F; "D0d"/D02.1H" | F. K2. "O"; D0.1H" | F. K2. "O
              MF/J"J0/02:D0dG.<"E0;>"?-2,6-.21&-.')P&06-.')&*)+,-W")8,.'2\%)N0)8T7N8!5"
'O?.;/@"%>=>@"R:GDO@"+>"*>@"(.H@"L>@"q"LEF/J@"%>"]8TT[^"#:D/N:CCDO/4"B.D/@"B2ODO;/".;3"=G/G2O>"
              !"#$%&'&(1$.')5,6;1$,"@"K@"!Z5N8T7>"
I<F;FI.<"12.I/FIO>"!6&*,""1&-.')!"#$%&'&(#7)I,",.6$%).-/)!6.$2!$,@"KR@"S5!NS5a>"
'0?.;/0"%>"=>"|8TT[^>"B20DF30;/D1"%01:2/>"VC,61$.-)!"#$%&'&(1"20)A00"S7TNS78>"
'0?.;/@"%>=>"|8TT[^>" ( .PF;K"1DHIJ:<:KH"."J:GDOJ:<3"M:23>"VC,6l$.-)!"#$%&'&(1"2@)AO@"SaSN
             SZ5>"
O::3J0.2/@"#>->@"'0?.;/@"%>=>@"A.2<:M@"->R>@"#.2/02@"m>@"-.?F3D:;@"`>X>@"R.KK<G;3@"`>m>" v ""
              AG<: IP@" ( >"]8TT[^>""%01:2/":C"/J0"8TT5"B20DF30;/F.<"*.DP"=:2I0":;", ?F30;I0NA.D03"
             B2. I/FIO>"VC, 61$. -)! "#$%&'&(1"20)AQ@"87!N8a5>"
=:<OH0"m>" ( >0" '0?.;/0"%>"=>0" `<OF?020"+>" '>0" #.<g.3:0"B>"m>0"R:GD00"+>"*>0" `G0EE0<0"+>" ~0" q"
              `O<OJO2@"X>"m>"]8TT[^>"$DF;K"I:EEG;F/H":G/20.IJ"/:"12:E:/0"F;/0K2./03"J0.</JI.204"+"
              1F<:/"12:U0I/>"!6&*,""1&-.')!"#$%&'&(#7)I,",.6$%).-/)!6.$21$,@)KR@"!85N!S!>"
20I:;;0I/F;K"/J0"EF;3":;3"Y:3H>"P&%-")8&G\1-")V/;..-$,/)520/1,")1-)+,/1$1-,@"A]!^>"
              J//1466MMM>UJ.DFE>I: E6CF<0D6.2/FI<0CF<0D613C6+L&( w ( .D/02w[w!w1#.2F:KI: EE>13C"
'0?.;/@"%>"=>"]8TT5^>"O2.3G./0"03GI./F:;"F;"I&F;FI.<"1DHIJ:<:KH"C;2"/J0"8!#!"I0;/G2H4",3GI./F;K"
            JO.</JI.20"12: ?F302D>"P&06-.')&*)E'1-1$.')! "#$%&'&(#0)AQ@"!Ta7N!TZT>"
'0?.;/@"%>"=>"]8TT5^>"O0:2K0"B>"*.H<:2@")&&&"]!ZS[N8TT9^>"VC,61$.-)!"#$%&'&(1"20)AZ0)
```

- +DD:IF./F:;4"+"JFD/:2FI.<";:/0":;"/J0"GD0":C"E03F./F:;"E0/J:3D>"VC,61\$.-)!"#\$%&'&(1"20" NN0"Z57NZ5Z>"

```
! "#$%&'&(#)1-)+, /1$. ')5, 221-("@)K@"![7N!78>"
'O?.;/@"%>"=>"]!ZZ[^>"*JO";OM"1DHIJ:<:KH":C"EO;>"!6&*,""]&-.')!"#$%&'&(#@"MR@"85ZN8[5>"
      *2.;D<./03"F;/:"V:2M0KF.;@"]!ZZ7^>"?CGO'"7)41/""\61*2)]&6)!"#\&'&(1@)NQ@"aN!["
'0?.;/@%>"=>"]!ZZ8^>"%0C<0I/F:;D":;"/.F<:203"/20./E0;/4"#:EE0;/D":;"X0</;02bD".2/FI<0>"4&G1$"/)I-)
      1. C1'#)! "#$%&'&(#). -/)E&O-", '1-(@"Q]S^@"5SN55>"
'0?.;/@"%>"=>"]!ZZ8^>",3F/:2F.<"P&06-.')&*)].C1'#)!"#$%&'&(#@"A@"SNZ>"
'0?.;/\(\mathreal^n\mathreal^n\)]!ZZ8^>"*J0"L:IF0/H"C:2"/J0"BDHIJ:<:KFI.<"L/G3H":C"(0;".;3"(.DIG<F;F/H>"4%,)
      P\&06-.')\&^*)+,-W'')520/1,''@"Q@"75N7[>"
''0?.;/@"%>"=>"]!ZZ8^>"+"K0;302N.M.20"3F?:2I0"120?0;/F:;"12:K2.E>"+,-c")520/1,")I,;1,>@B]8^@"
      !5N8T>"
' 0? . ;/@"%>"=>"] ! ZZ8^>"* : M .23"/J0"20I : ;D/2GI/F: ; " : C" E .DIG&; ;F/H>"P&06 - . ')&*) ] . C1'#) ! "#$%&' & (#@"
      N[S69^{0}]S7ZN9T8"*2.; D<../03"F;/:"m.1.; ODO0"]!ZZ5^>"<353YP.G.-)X&C, -c")P&O6-. '0)=&3)
      !Z@"8!N99>""
'0?.;/@"%>"=>@"RF2DIJ@"'>@"#0<0;/.;:@",>@"#:gg.@"*>@"RF<<@"L>@"(.I,.IJ02;@"(>@"(.2/H@"V>@"q"
      LIJ;030P02@m>"]!ZZ8^>"*J0"E.<0"2:<04"+;"F;?0D/FK./F:;":C"I:;/0E1:2.2H";:2ED>"P&06-.')&*)
      +,-2.')8,.'2%)E&O-",'1-(@"QS@"S85NSS7>"
V0<D:; ("X>("q"'0?:;/("%)"=>"]!ZZ!^>"+;"0?.<G./F:; ":C"."DPF<<D"/2.F;F;K"12:K2.E"C:2"D/01C.EF<
      1.20;/D>"].Cl'#)I,'.21&-"@"SZ@"8Z!N8Z[>"
'O?.;/@"%>"=>"]!ZZ!^>"#J.;KOD"F;"C./JO2Db"2:<O"I:E1<FI./OD"/JO"2O<./F:;DJF1"YO/MOO;"1.20;/.<"
      E::3".;3".3: <ODIO; /"CG; I/F:; F; K>"P&06-.')&*) 1. C1'#)! "#$%&'&(#0)$0"878N875>"
'O?.;/@"%>"=>"]!ZZT^>"BDHIJ:<:KFI.<"D02?FIOD"30DFK;03"C:2"E0;4"."1DHIJ:03GI./F:;.<".112:.IJ>"
      ! "#$%&2%, 6. G#@)MR@"STZNS!5>"
! "#$%&2%, 6. G#@)MR@"ST7NSTa>"
\#03.20\text{"A}\times0\text{"q}\text{"'0?.;/"} \Rightarrow ]!ZZT^>"+"E0/.N.;. < HDFD": C"/J0"OCCOI/D": C"B.20;/", CCOI/F?0; ODD"*2.F; F; K>"
      VC, 61$. -)P&06-. ')&*) ] . C1'#)4%, 6. G#@"QJ@"S7SNSa9>"
'O?.;/@"%>"=>@"L<.//O2H@"L>@"':FDO<<O@"m>@"L.MHO2NLEF/J@")>@"q"LIJ;0F3O2@"%>""]!ZZT^>"
      V:;N/2.3F/F:;.<"1./02;.<"Y0J.?F:2"MF/J"DIJ::<N.K03"3.GKJ/02D>"+"3FDI2FEF;.;/".;.<HDFD":C"
      I:K;F/F?0@".//F/G3F;.<@"YOJ.?F:2.<@"/FE0"GD0@".;3"30E:K2.1JFI"?.2F.Y<0D>"VO"26.'1.-)P&06-.')
      &*) + . 661. (,). -/)2%,) ]. C1'#@)QQ@"8aNS5>"
  .;FKDYO2K@"m>@" '0?.;/@"%>"=>""]!Zaa^>"B.20;/.<".//F/G30D@"IJF<320;bD"DO<CNI:;I01/".;3"Y0J.?F:2"
      C:«:MF;K"1.20;/Db"1.2/FIF1./F:;"F;"1.20;/"/2.F;F;K"K2:G1D"P&06-.')&*)E&CCO-12#)
      !"#$%&'&(#@)QA@"!58N![T>"
'0?.;/@"%>"=>""]!Za7^>"*J0"GD0":C"E.2P0/F;K"/0IJ;FfG0D"/:"C.IF<F/./0".II01/.;I0":C"120?0;/F:;"
      12: K2. ED"! 6&*, ""1&-. ')! "#$%&'&(#7)I, ", .6$%). -/)! 6. $21$, @)QJ@"[9TN[98>"
```

```
?-2,6-.21&-.')P&06-.')&*) ]. C1'#)4%,6.G#@"K@"!STN!9S>"
'O?.;/@"%>"=>@"L<.//O2H@"L>@"q"L<:Y:3F.;@"B>"]!Za!^>"+"DHD/OE./FI"DPF<<D".112:.IJ"/:"/JO"DO<OI/F:;"
      .;3"/2.F;F;K":C"C:D/O2"1.20;/D".D"E0;/.<"J0.</J"1.2.N12:CODDF:;.<D"&&4"*2.F;F;K>"P&O6-.')&*)
      E&CCO-12#)! "#$%&'&(#@"B@"8S!N8Sa>"
'0?.;/@"%>"=>@"q"O002@"(>"]!Za!^>"+"DHD/0E./FI"DPF<<D".112:.IJ"/:"/J0"D0<0I/F:;".;3"/2.F;F;K":C"
      C:D/O2"1.20;/D".D"E0;/.<"J0.</J"1.2.12:CODDF:;.<br/>.CD"&4"B2:UOI/":?02?FOM".;3"DO<OI/F:;>"
      P&06-.')&*)E&CCO-12#)!"#$%&'&(#@)B@"889N8ST>"
'0?.;/@"%>"=>"]!Za!^>"#:G;D0<F;K"1DHIJ:<:KFD/D".;3"/J0"V./F:;.<"%0KFD/02":C"R0.</J"L02?FI0"
      B2: ?F3O2D"F; "BDHIJ:<: KH4"+"/2.; DF/F:; "1: <FIH>"4%, )E&O-", '1-()! "#$%&'&(1"20)B@"a8NaS>"
'0?.;/@"%>"=>"]!ZaT^>"L:IF:<:KFI.<".;3"I<F;FI.<"E:30<D":C"/J0"C.EF<H4"+;".//0E1/"/:"F30;/FCH"
      1.2.3FKED>"VC, 61$. -)P\&06-. ')&*) 1. C1'#)4%, 6. G#@"J@"5N8T>"
"0?.: /0"\% > "=>"] ! ZaT^> "*J0"I < .DDFCFI./F:: ":C"/J0"CF0 < 3":C"C.EF < H"/J02.1H4" + "20?F0M":C"12F:2".//0E1/D"
      F;"R.;D0;@m>"#>"q"%:D0;/J.@"->"], 3D@"!Za!^>"526.2, (1, "). -/)4, $%-1d0, ")l-)]. Cl'#)
      4%, 6. G#>"L12F; KCFO<3@"& '4"#J.2<0D"#>"*J:E.D>"
"0?.;/@"\%>"=>"]!Z7a^>"#&F0;/NI0;/0203".112:.IJ0D"/:"M:2PF;K"MF/J"/J0"C.EF&H4"+;":?02?F0M":C"
      "VOM" 30?0<: 1E0; /D" F; "/J02.10G/FI@" 03GI./F: ; .<@" .; 3" 120?0; /F?0" E0/J:3D>" ?-2,6-.21&-.')
      P\&06-.')\&*) 1. C1'#)E\&0-", '1-(@)A@"S!N99>"
'0?.;/@"%>"=>"]!Z7a^>"=.EF<H"/J02.1H4"+"I<F0;/NI0;/0203"102D10I/F?0>"P&06-.')&*)+.661.(,).-/)
      ) ] . Cl'#) E&O-", 'l-(@) S@" S5N98>"%012F; /03"F; "m>m>" ( IX JF2/02"]!ZaT@", 3>^>"!6&9', C) 5&'; l-()
      >12\%) J. C1'1, ">"+2Fg:;." - 01.2/E0;/":C", I:;: EFI"L0IG2F/H>"
G"76.)-(<3.*C6H#(33$,*"7,*;7*/-$<"-"3(17*
! "#$%&'() *(+*(, (-./%&0'(1*(2*(345467*(89.(:.;$%0$&<(#=>.(=?(&=#:%0$/.(:%>.(%>.@$09A:$%(=&(09.(
       #.>%0$=&B9$C(D.0E..&(0#%;$0$=&%>(:%BF">$&$0A($;..=>=<A(%&;(.:=0$=&%>($&0.>>$<.&F.(%:=&<(
       G\&; \%\&(:.\&* 3B"D: \$00.; (0=(\#.?.\#..; (H="\#\&\%)>7*((
) FI "#; A'(J*(1*(, ((-./%&0'(1*(2*(345447((!""#""$#%d'()'*+$#%, "'-%d#.#"&'-%'/012'34"54674%#""
       3B"D: $00.;(0=(#.?.#..;(H="#&%>78
```

## 211P\*A4"<3\$-.\*

"

\*022FggF@"m" q" '0?:;/@"%>"=>"]8T8S^>"=0EF;F;F/H"&30:<:KH".;3"&/D" (0.DG20E0;/"\$DF;K"/J0" =0EF;F;F/H"&30:<:KH"LI.<0".;3"&/D"LJ:2/"=:2E"]11>"dNd^>"&;"LJ.IP0<:23@"\*>" >>@",3>",;IHI<:103F.":C"L0dG.<"BDHIJ:<:KH".;3"A0J.?F:2>"V0M"e:2P4"L12F;K02>" J//1D4663:F>:2K6!T>!TT76Z7aNSNTS!NTaZ5[N5w897[N!"

 $X : \langle CO@"O\rangle @""O?..; /@"\% >= \rangle "]8T8S^>"OO; 302"\% : \langle O"L/2.F; "B.2.3FKE"]11>"dNd^>"&; 4"LJ.IP0<math>\langle C: 23@"*> \rangle = \rangle "$ 

% > "=> "q"X:; K ("e>"m>"], 3D > > "4%, ) G'' # % & (#) & \*) C, -). -/) C. "\$ O' 1 - 121, "3"X. DJF; K/:; ("-#4") W = 1.5 ("E-F) W = 1.5 ("

```
'O?.;/0"%>"=>0"LE.<<0H0"`>"A>0"%.;PF;0"*>"m>0"#:<Y:M0"+>0"-.?F30"`>0"q"XF<F.ED0"#>"(>""]8T!T^>"
                                               X : E0; ID"V : ;/2.3F/F : ;. < "L0dG. < F/H" c G0D/F : ;;. F20>"&;" = FDJ020" * \bar{\text{N}}" - . ? FD0" # > 0"" e . 2Y020" X > 0" q " = FDJ020" * \bar{\text{N}}" - . ? FD0" # > 0"" e . 2Y020" X > 0" q " = FDJ020" * \bar{\text{N}}" - . ? FD0" # > 0"" e . 2Y020" X > 0" q " = FDJ020" * \bar{\text{N}}" - . ? FD0" # > 0"" e . 2Y020" X > 0" q " = FDJ020" * \bar{\text{N}}" - . ? FD0" # > 0"" e . 2Y020" X > 0" q " = FDJ020" * \bar{\text{N}}" - . ? FD0" # > 0"" e . 2Y020" X > 0" q " = FDJ020" * \bar{\text{N}}" - . ? FD0" # > 0"" e . 2Y020" X > 0" q " = FDJ020" * \bar{\text{N}}" - . ? FD0" # > 0"" e . 2Y020" X > 0" q " = FDJ020" * \bar{\text{N}}" - . ? FD0" # > 0"" e . 2Y020" X > 0" q " = FDJ020" * \bar{\text{N}}" - . ? FD0" # > 0"" e . 2Y020" X > 0" q " = FDJ020" * \bar{\text{N}}" - . ? FD0" # > 0"" e . 2Y020" X > 0" q " = FDJ020" * \bar{\text{N}}" - . ? FD0" # > 0"" e . 2Y020" X > 0" q " = FDJ020" * \bar{\text{N}}" - . ? FD0" # > 0"" e . 2Y020" X > 0" q " = FDJ020" * \bar{\text{N}}" - . ? FD0" # > 0"" e . 2Y020" X > 0" q " = FDJ020" * \bar{\text{N}}" - . ? FD0" # > 0"" e . 2Y020" X > 0" q " = FDJ020" * \bar{\text{N}}" - . ? FD0" # > 0"" e . 2Y020" X > 0" q " = FDJ020" * \bar{\text{N}}" - . ? FD0" # > 0"" e . 2Y020" X > 0" q " = FDJ020" * \bar{\text{N}}" - . ? FD0" # > 0"" e . 2Y020" X > 0" q " = FDJ020" * \bar{\text{N}}" - . ? FD0" # > 0"" e . 2Y020" X > 0" q " = FDJ020" * \bar{\text{N}}" - . ? FD0" # > 0"" e . 2Y020" X > 0" q " = FDJ020" * \bar{\text{N}}" - . ? FD0" # > 0"" e . 2Y020" X > 0" q " = FDD120" * \bar{\text{N}}" - . ? FD0" # > 0"" e . 2Y020" X > 0" q " = FDD120" * \bar{\text{N}}" - . ? FD0" # > 0"" e . 2Y020" X > 0" q " = FD120" X > 0" e . 2Y020" X 
                                               -.?FD@"L>"],3D^>"8.-/9&&\)&*)",HO.'12#Y6,'.2,/)C,."06,")TK6/)D/3U"]11>"[!aN[88^"
                                               X.DJF; K/:; \theta'' - > \# > \# = 0.; IFD>""
   0?..; (0?) > 18T!T ( 0.01G < F.F/H < F.F.F < 0.020 < 0.020 < 0.020 < 0.020 < 0.020 < 0.020 < 0.020 < 0.020 < 0.020 < 0.020 < 0.020 < 0.020 < 0.020 < 0.020 < 0.020 < 0.020 < 0.020 < 0.020 < 0.020 < 0.020 < 0.020 < 0.020 < 0.020 < 0.020 < 0.020 < 0.020 < 0.020 < 0.020 < 0.020 < 0.020 < 0.020 < 0.020 < 0.020 < 0.020 < 0.020 < 0.020 < 0.020 < 0.020 < 0.020 < 0.020 < 0.020 < 0.020 < 0.020 < 0.020 < 0.020 < 0.020 < 0.020 < 0.020 < 0.020 < 0.020 < 0.020 < 0.020 < 0.020 < 0.020 < 0.020 < 0.020 < 0.020 < 0.020 < 0.020 < 0.020 < 0.020 < 0.020 < 0.020 < 0.020 < 0.020 < 0.020 < 0.020 < 0.020 < 0.020 < 0.020 < 0.020 < 0.020 < 0.020 < 0.020 < 0.020 < 0.020 < 0.020 < 0.020 < 0.020 < 0.020 < 0.020 < 0.020 < 0.020 < 0.020 < 0.020 < 0.020 < 0.020 < 0.020 < 0.020 < 0.020 < 0.020 < 0.020 < 0.020 < 0.020 < 0.020 < 0.020 < 0.020 < 0.020 < 0.020 < 0.020 < 0.020 < 0.020 < 0.020 < 0.020 < 0.020 < 0.020 < 0.020 < 0.020 < 0.020 < 0.020 < 0.020 < 0.020 < 0.020 < 0.020 < 0.020 < 0.020 < 0.020 < 0.020 < 0.020 < 0.020 < 0.020 < 0.020 < 0.020 < 0.020 < 0.020 < 0.020 < 0.020 < 0.020 < 0.020 < 0.020 < 0.020 < 0.020 < 0.020 < 0.020 < 0.020 < 0.020 < 0.020 < 0.020 < 0.020 < 0.020 < 0.020 < 0.020 < 0.020 < 0.020 < 0.020 < 0.020 < 0.020 < 0.020 < 0.020 < 0.020 < 0.020 < 0.020 < 0.020 < 0.020 < 0.020 < 0.020 < 0.020 < 0.020 < 0.020 < 0.020 < 0.020 < 0.020 < 0.020 < 0.020 < 0.020 < 0.020 < 0.020 < 0.020 < 0.020 < 0.020 < 0.020 < 0.020 < 0.020 < 0.020 < 0.020 < 0.020 < 0.020 < 0.020 < 0.020 < 0.020 < 0.020 < 0.020 < 0.020 < 0.020 < 0.020 < 0.020 < 0.020 < 0.020 < 0.020 < 0.020 < 0.020 < 0.020 < 0.020 < 0.020 < 0.020 < 0.020 < 0.020 < 0.020 < 0.020 < 0.020 < 0.020 < 0.020 < 0.020 < 0.020 < 0.020 < 0.020 < 0.020 < 0.020 < 0.020 < 0.020 < 0.020 < 0.020 < 0.020 < 0.020 < 0.020 < 0.020 < 0.020 < 0.020 < 0.020 < 0.020 < 0.020 < 0.020 < 0.020 < 0.020 < 0.020 < 0.020 < 0.020 < 0.020 < 0.020 < 0.020 < 0.020 < 0.020 < 0.020 < 0.020 < 0.020 < 0.020 < 0.020 < 0.020 < 0.020 < 0.020 < 0.020 < 0.020 < 0.020 < 0.020 < 0.020 < 0.020 < 0.020 < 0.020 < 0.020 < 0.020
                                                     , -$#$'&G, /1.)&*)G''#$%&'&(#)TS2%)D/3U"]11>"Z[9NZ[[^>"R:Y:P0;@"Vm4"m:J;"XF\0H"q""L:;D\"
   "0?.; @ \% > "\Rightarrow "q "XFE02@ -> "m > "18T!T > "*J0"; OM "C./J02F; K"E: ?0E0; /> "\&; "Q20; "#> "s> "q "Q20; @ "-> "M" > "NE02@ -> "M" > "NE02@ -
                                                    #>"], 3D>\\"E&O-", '1-()\*. 2\%, 6\""]11\"S\\8!\\\"V0M"e: 2P4\\": G\<\03K\O\\"
   ' 0?.;/@"%>"=>" q "XF<F. ED@"#>"]8TTZ^>"*J0"1DHIJ:<:KH":C"E0;".;3"E.DIG<F;F/H>"&;"m>"A2.H" q " (>"
                                                  L/.;/:;"], 3D^{4}, X'', \#Y'', N>, ")\%. -/9&&\\&*)*. C''\#\%\&'&(\#"]11>"5aa\SZZ^\"
                                                   QdC: 23@"$ \ 4"A<. IPMO<<"BGY<FDJF; K>"
   '0?.;/@"%>"=>"]8TT[^>"=:2M.23>"&;"L1022H@"'>"!"#$%&'&(1$.')26,.2C,-2)&*)$%6&-1$)1''-,""'7)4%,)
                                                    91&G"#$%&"&$1. ')2%, 6. G#). GG6&. $%}"]11>";1!Y!H^>X .DJF;K/:;@" - #4"+B+"Y::PD>"""
   '0?.:/0"%>"=>"]8TT[^>", ?F30; IONY.D03"12.I/FI0"F; "1DHIJ:<:KH>"&; "L.<PF; 30"V>"], 3>^>"
                                                   D-\$\#\$'\&G, /1.)\&\$/C, ."06, C, -2). -/)"2.2l"2l\$")]1>"S8[^>"*J:GD.;3"Q.PD@"#+_"L.KO>"
   "0?.;/@"\%>"=>"[8TT[^>"*J0"(..<0"\%:<0"V:2ED"&;?0;/:2H>"&;"L.<PF;3@"V>"],3>^>D-$#$'&G,/1.)&*)
                                                   (C, ..., 06, C, -2). -/)"2. 21"21$""]11>"5[SN5[9^\"*J:GD.;3"Q.PD@#+ "L.KO\"]
   ' 0?.;/@"%>"=>"]8TT[^>"=:2M.23>"&;",;K<.2N#.2<D:;@"(>"q"L/0?0;D@"(>"],3D>>"?-)2%,)6&&C)>12%)
                                                    (C, -7)V)$. ", 9&&\\&')2%, 6. G, 021$)$%. - (, ""]11>"H, YHH^>" X.DJF; K/:; @" - #4"+B+"Y:: PD>"
 V: 2I2: DD@"m" "#>@"AOG/<02@" '>", >@" q " '0?.; /@"%>"=>"]8TT5^>""B2: <: KGO>"&; ""V: 2I2: DD@"m" "#>@"AOG/<02@" '>" | AOG/<02@" 'AOG/<02@" 'AOG/<02@"
                                                       \mathbb{Z}^{0}, \mathbb{Z}
                                                   /1. '&(O, )&-)2\%, )*O-/.C, -2. ')dO, ''21&-''']11>"SN!8^"X.DJF;K/:;<math>@"-#4"+B+"Y::PD>""
```

!1711/-)005.46(<)0.2117)0.2(-)0.2()005.46(<)0.2117)0.2(-) with G(0)0.231075.560.2726(/)0.2' But JEQ0.231076