





\*!\$ @?66E6!G#(E! H!E/6!- \*S!&8' P661F6!, ' @?' 868E(!\$08!Q6!H' 581!0E!  
/EE?(<JJPPP2(4(52615J5.Q08?0088#8FJF.0150E6J@0(E6.(T#8T5.Q08T?0088#8FJ?00T%8' P661F62?/?!

C

!#(!.6X5#.61!081!P#G!(6.L6!0(!!.6H6.68\$6!  
E/. ' 5F/' 5E!E/6!\$' 5.(6!B/6!E6\EQ' ' %!?' L#16(!16E0#61)!(E6?TQ9T(E6?!#8(E.5\$E# 8(!#8!E/6!5(6!' H! \* . \$V+! !- . ' 2!!!  
I @#E/)!c0L#1!6E!0G!



- B' !E.60E! E/6.!(E5168E(!081!E/6!#8(E.5\$E' .!P#E/!0Q(' G5E6!.6(?6\$E)!(5???' .E#8F!H6G' P!(E5168E(!P/686L6.! ?' ((#Q66!P#E/!E/6#.!G60.8#8F!' Q46\$E#L6!)!081!@#8#@#e#8F!1#(E.0\$E# 8(!#8!\$G0(!
- B' !\$' @?G6E6!0G!0((#F8@68E(!' 8!E#@6!081!?' .H6((# 80G9!0\$\$' .1#8F!E' !(9G0Q5(!.6X5#.6@68E(!
- B' !H5G9!.601!081!5816.(E081!0G!0(?6\$E(!' H!E/6!(9G0Q5(!081!E' !\$0..9!' 5E!E/6!.6X5#.6@68E(!/6.6#8!
- B' !0\$E#L669!081!\$' 8(#(E68E9!?0.E#\$#?0E6!#8!\$G0(!1#(\$((# 8(!081!X56(E# 8T081T08(P6..!(6((# 8(!
- B' !16@' 8(E.0E6!(6GHT

V##-P" + 1"\$>!#8\$G516(!E/6!@0E6.#0G!#8!\$/0?E6.(!;)!C!081!N!' H!E/6!E6\EQ' ' %!081!P#GG!Q5#G1!' 8!E/6!(%#GG!  
\$' L6.61!#8!\*((#F8@68E!\*!)#8\$G51#8F!V+I!?' 46\$E!P' .%HG' P!081!?' QG6@!#168E##\$0E# 8)!6\?G' .0E' .9!08069(#Q)!  
081!Q6(E!?.0\$E#\$6(!H' .!.6L#6P#8F!F6' (?0E#0G!10E02!



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I E5168E! ?0.E#\$#?0E# 8!#8!\$G0((!1#(\$5((# 8(!#(!0!L#E0G!\$ @?' 868E! H!E/#(!\$' 5.(6!081!(E5168E(!(/' 5G1!@0%6!6L6.9!  
0EE6@?E!E' !0EE681!0GG!\$G0((6(!081!0\$E#L6G9! ?0.E#\$#?0E6!#8!1#(\$5((# 8(2!+8!\$0(6(!P/6.6!0!(E5168E!@#((6(!0!  
(#F8#H#08E!85@Q6.! H!G6\$E5.6(!' .!1' 6(!8' E!0\$E#L6G9! ?0.E#\$#?0E6!#8!1#(\$5((# 8Q)!E/#(!P#G!#@?0\$E!E/6!H#80G!\$' 5.(6!  
F.0162!! \*\$\$. .1#8F!E' !R8#L6.(#9!?' G#9!b! [TCD)! I E5168E(!(/' 5G1!0EE681!0GG!@66E#8F(!' H!E/6#.!\$G0((6Q)!8' E!' 8G9!  
Q6\$05(6!E/69!0.6!.6(?' 8(#Q66!H' .!@0E6.#0G!1#(\$5((61!E/6.6#8)!Q5E!Q6\$05(6!0\$E#L6! ?0.E#\$#?0E# 8!#(!H.6X568E9!  
6((68E#0G!E' !68(5.6!@0\#@5@!Q686H#E!H' .!0GG!@6@Q6.(! H!E/6!\$G0((2! \*EE68108\$6! ?6.!(6!(/0GG!8' E!Q6!5(61!0(!0!  
\$.#E6.#' 8!H' .!F.01#8F2a!

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\* ((#F8@68E(!0.6!156!0E!E/6!10E6!081!E#@6!(?6\$#H#61!' 8!60\$/!0((#F8@68E!/081' 5E2!+8!' 8G9!.0.6!#8(E08\$6(!P#G!  
G0E6!0((#F8@68E(!Q6!0\$6?E61)!0(!16(\$.#Q61!Q6G' P2!p0E6!0((#F8@68E(!P#G!.6\$6#L6!0!' 86T66EE6.!F.016!1615\$E# 8!  
H' .!60\$/!109!08!0((#F8@68E!#!G0E62!b' .!6\0@?66)!#H!E/6!0((#F8@68E!P' 5G1!/0L6!.6\$6#L6!0!F.016!' H!` Sa!Q5E!#(!  
(5Q@#E61!' 86!109!G0E6)!#E!P#G!.6\$6#L6!08!0145(E61!F.016!' H!` , a2!

+!.60G#e6!E/0E!G#H6!/0??68(2!+H!9' 5!6\?6\$E!8' E!E' !Q6!0Q66!E' !\$' @?66E6!08!0((#F8@68E!' 8!E#@6)!#E!#!#@?' .E08E!H' .!  
9' 5!E' !1' !EP' !E/#8F(2

;2!, ' 8E0\$E!@6!, \$).1, #)\$@I)2 (&#%#)M%- (%\$()\$21)4&1)4, \$1!081)!#H!0???' ?.#0E6)!E/6!' E/6.!(E5168E(!#8!0!  
F.' 5?!:H' .!F.' 5?!?.' 46\$E!P' .%A2!+H!9' 5!1' !8' E!\$' @@58#\$0E6!08!08E#\$#?0E61!G0E6!0((#F8@68E!P#/#8!E/#(!  
E#@6H.0@6)!E/6!0((#F8@68E!P#G!.6\$6#L6!0!F.016!' H!e6.' 2!

C2!!-.' L#16!0!10E6!081!E#@6!Q9!P/#\$!E/6!G0E6!0((#F8@68E!P#G!Q6!(5Q@#E612!+H!E/6!G0E6!0((#F8@68E!#!  
8' E!.6\$6#L61!' 8!E/6!10E6!?' .#@#(61)!E/6!0((#F8@68E!P#G!.6\$6#L6!0!F.016!' H!e6.' 2!!

V)+, ^- + & +)(0)\$8()., \$1), ##-P" + 1"\$#)\$2, \$), 421%1)\$(\$2-#)M(-' 5)8-.)91), ' ' 1M\$14!0GG!(5Q(6X568E!G0E6!  
0((#F8@68E(!P#G!.6\$6#L6!08!05E' @0E#\$!F.016!' H!e6.' 2!I' .9)!8' !6\6\$?E# 8(!E' !E/6(6!?' G#\$#6(!P#G!Q6!F.08E61)!#8!  
H0#.86((!E' !E/6!@04' .#9!' H!(E5168E(!P/' !(5Q@#E!E/6#.!P' .%! 8!E#@62



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\*(!@5\$/!0(!?' ((#Q66JH60(#Q66!F#L68!9' 5.!58#X56!\$#. \$5@(E08\$6(!0E!/' @6)!?660(6!E5.8!' 8!9' 5.!r' ' @\$0@6.0!  
E/. ' 5F/' 5E!E/6!\$G0((!@66E#8F2!+H!9' 5!/0L6!(?6\$#0G!8661(!' .!.6X56(E!H' .!089!#81#L#150G!0\$\$' @@' 10E# 8Q)!?660(6!  
1#(\$5((!E/#(!P#E/!E/6!#8(E.5\$E' .(2!!

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B/#(!\$' 5.(6!' .!?' .E# 8(!' H!E/#(!\$' 5.(6!:#262)!66\$E5.6Q)!1#(\$5((# 8Q)!(E5168E!?.6(68E0E# 8(A!P#G!Q6!.6\$' .161!H' .!  
#8(E.5\$E# 80G!' .!615\$0E# 80G!?'5.'? (6(2!B/6!.6\$' .1#8F(!P#G!' 8G9!Q6!(/0.61!P#E/!(E5168E(!68. 'G61!#8!E/6!\$G0((!  
E/. ' 5F/!, 08L0(2!B/6!.6\$' .1#8F(!P#G!Q6!1666E61!0E!E/6!681!' H!E/6!(6@6(E6.2!

R8#L6.(#E9!?' #9\$!;! ;CTOA!.6X5#.6(!\$' 8(68E!H.' @!0G!#81#L#150G(!P/' !P#G!0??60.!#8!0!\$G0((!.6\$' .1#8F2!+H!9' 5!1' !  
8' E!P#(/!E' !Q6!#168E#H#61!#8!0!\$G0((!.6\$' .1#8F)!?660(6!1#(\$5((!E/#(!P#E/!E/6!#8(E.5\$E' .(2!b' .!6\0@?66)!P6!@09!  
?6.@#E!08!`08' 89@' 5(a! ?E# 8!:62F2)!9' 5!E6@?' .0.#9!E5.8#8F!' HH!#168E#H#8F!#8H' .@0E# 8!H.' @!E/6!r' ' @!  
(6((# 8)!#8\$G51#8F!80@6!081!?\$E5.6)!?.'# .!E' !.6\$' .1#8FA2!!

I E5168E(!0.6!8' E!0G' P61!E' !.6\$' .1!P#E/' 5E!#8(E.5\$E' .!76.@#((# 82!\*G(')!(E5168E(!0.6!?' /#Q#61H.' @!  
.6\$' .1#8F!\$G0((!0\$E#L#E#6(!:#8\$G51#8F!\$G0((!66\$E5.6Q)! HH#6!/' 5.0)!01L#(#8F!(6((# 8Q)!6E\$2A)!1#(E.#Q5E#8F!\$G0((!  
.6\$' .1#8FQ)! .!?' (E#8F!\$G0((!.6\$' .1#8F(2! ] 0E6.#0G(!\$.60E61!Q9!E/6!#8(E.5\$E' .!H' .!E/6!\$' 5.(6!:(9G0Q#)!66\$E5.6(!081!  
G6\$E5.6!8' E6Q)!?.6(68E0E# 8Q)!6E\$2A!0.6!\$' ?9.#F/E61!Q9!E/6!#8(E.5\$E' .2!R8#L6.(#E9!?' #9\$!;! ;CTOA!#(!#8!?\$G0\$6!E' !  
?' .E6\$E!E/6!?' .#L0\$9!' H!(E5168E(!#8!E/6!\$' 5.(62!!

I E5168E(!P/' !.6\$' .1)!1#(E.#Q5E6)! .!?' (E!E/6(6!@0E6.#0G(!P#G!Q6!.6H6. .61E' !E/6!E5168E!, ' 815\$E!081!KE/#\$0G!  
C6L6G' ?@68E! HH#62!R805E/' .#e61!.6\$' .1#8F!@09!L# 00E6!58#L6.(#E9!081!(E0E6!G0P2!

I E5168E(!@5(E! QE0#8!76.@#((# 8!#8!01L08\$6!E' !.6\$' .1!0G!5(6)0.5(.)-0.0.3(15)0.5(')#-0.3(.-)-0.3(.1L)0.33(#8)-(6)0



61#E# 8!:R8#L6.(#E9!' H!, /#\$0F' !-.6(Q)!C=; YA2!, ' ?#6(10.6!0L0#00G6!#8!E/6!I hI R!&#8F!p#Q.0.92!\* 11#E# 80069)!E/6!  
Q' '%!#(!.600E#L6

+!0G(' !@080F6!E/6!V+I!K15\$0E# 8!, 68E6.H' .!0!8' 8T?.' H#E!' .F08#e0E# 8!\$0G61!S09V6' 2!\* 11#E# 80G9)!+!/0L6!\$' T  
05E/' .61!0!Q' ' %!E#E661! !P#E/!-.' H6(( ' .!] #%6!-' F' 1e#8(%#!' H!E/6!I h I R!K\$' 8' @#\$(!  
C6?0.E@68E)! .6660(61!#8!G0E6!C=; C!Q9!K(.#!- .6((2!+!0G(' !68F0F6!#8!0!85@Q6.! ' H!H.66G08\$6!V+I!?' . 46\$E!)!  
#8\$G51#8F!E.08(#E! ?G088#8F!080G9(6(!H' .!] ' Q#G#E9!-G0886.)!pp, !081!E/6!16L66' ?@68E!' H!#8E6.0\$E#L6!P6Q0??(2!!  
!  
+!/0L6!Q668!E60\$/#8F!0E! I h I R!(#8\$6!C==0!081)!+!@5(E!01@#E)!#E!#(!@9!H0L' .#E6!4' Q!' H!E/6!@089!+'L6!G#(E61!0Q' L62!



=1T-18)Q1##- ("g)\&-]hI)  
QR-.)Q1\$)AC): %1#1"\$-"P), " 4)Q2, %-"P)V", .5#-#)=1#&.\$#)  
B#@6!' 8\$6!0F0#8!E' !(E6?!Q0\$%!081!.6L#6P!E/6!(%#GG(!\$' L6.61!' L6.!!  
E/6!?0(E!EP' !P66%(!#8!\$/0?E6.(!IT02!B/68!#E^(!E#@6!H' .!X5#e!yDg!  
j 6\E)!P6!P#GG!G' '%!0E!\*.\$V+I!-.' !E' ' G(!E/0E!/6G?!5(!\$.60E6!  
?.' H6((# 80GTG' '%#8F!@0?(2!B/68!P6^GG!G60.8!0Q' 5E!P09(!E' !(/0.6!  
E/6!.6(5GE(!' HI9' 5.!P' .%!' 8!E/6!P6Q!5(#8F!\*.\$V+I!W8G#862!

VM%G)FB)

!!!\_R+r!yD!!!!

Assignmen >!

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