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A, 5+R%+, &/ "#&; 7 "D&B5: 7B8N#2A"#; 5/+% "6#+, %. /& O7: F#23#+, &5/#2A"#A, 5+& "&886#O; 7 "D&B5: 7B# /&B5D52%8#B&76&/8N#5"3B%&": &#, &B. &6#. %8, #5"+2#3/%5+52"#+, /O7+52"#23#+, "3&6&/7: F6#H, &# 8&.7/7+52"#<&+A&&"#"2/+, &/ "#7"6#82%+, &/ "#&; 7"D&B5: 7B#6&"2O5"7+52"8#A78#: &"+&/&6#2"# 6587D/&& O&"+8#2; &/#8B7; &/F6#M, 5+R%+, &/ "&/8#/&A/2+&#+, &#"7//7+5; #+, 5B#M7/#+2#658+7": &# +, & O 8&B; &&8#3/2O#8B7; &/F)#7"6#A, 5+&#&; 7"D&B5: 7B8#"2+#2"BF#7BB2A&6#<%+#&": 2%/7D&6#5+6#H, 58# /&A/5++&"#, 58+2/F#A78#87": +535&6#<F#A, 5+R%+, &/ "#&; 7"D&B5: 7B8)#7"6#5+#. /&8&"+&6#+, &#A, 5+&#-2%+, #

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OT7 0 5"5"D#+, &#/, &+2/5:7B#+, & 0 &"# J &7D7"N#/&++*#7"6#&&:2"6+&#./&&56&"+57B#:70.75D"# 7""2%":& 0 &"+8)#, 5&#\$%BF#?!")#=>Z*#8.&&:, #7::&.+5"D#+, &# J &.%<B5:7"#.7/+FN&#./&&56&"+57B# "2 0 5"7+52")^+'#, 5&# 9 %D%&+#''^/)#=>Z*#8.&&:, #7+#+, &# g 7BB7&# J &% "52"#9/&7)^+(#7"6#, 5&# S 7/:, #@^{0/})# =>Z@#CO; 5B#O 0.5/&E

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O;&"#+, 2%D, #&; 7"D&B5: 7B8#A&/%:5"D#2..285+52")#J&7D7"#<&B5&; &6#+, 7+#9O&/5:7# 6&.&"6&6#2"#Q26)#82#&; 7"D&B5: 7B8#O%+#<"#+, &# 2B5+5: 7B#8., &/&#<&:7%8&#+, &F#A&/&#+, "BF# 2"&8#35D, +5"D#32/#Q266#J&7D7"N8#/&3&/&":&#+2#\$2, "#M5"+, /2..#5"#, 58#35/8+#:7"6567:F#8.&&:, #58#7# .7/+5:%B7/BF#D226#&T7O.B#+, 58##`%2+5"D#M5"+, /2.)#, ̔&/+&6#+, 7+)#C53#A, 7BB#6&7B#37B8&BF# A5+, #2%/#Q26#5"#+, 58#A2/P#A&#, 7; &#% "6&/+7P&"#i5"#:/&7+5"D#9O&/5:7j#7"6#82#:7%8&#R5O#+2# A5+, 6/7A#R58#./&8&"+#, &B.#3/2O#%8)#A, 7BB#<&#O76#8+2/F#7"6#7#<FA2/6#+, /2%D, 2%+#+, &# A5+, 6/7A#R58#./&8&"+#, &B.#3/2O#%8)#A, 7BB#<&#O76#8+2/F#7"6#7#<FA2/6#+, /2%D, 2%+#+, &# A2/B66E^{%*#}H, 58#/&3&/&":O.B5&6#+, 7+#J&7D7"#<&B5&;&6#+, &#/&782"#&;7"D&B5:7B8N#5"; 2B;&O&"+#A78# &88&"+57B#5"#.2B5+5:8#A78#<&:7%8&#, &#<&B5&;&6#9O&/5:7N8#3%+%/&#A78#6&.&"6&"+#2"#Q26N8#, &B.G# ^D"2/5"D#2/#C6&7Bi5"Dj#37B8&BF#A5+, kQ26E#A78#67"D&/2%8#7"6#.28&6#7#+, /&7+#+2#+, 	O&/5:7"# &T58+&":&&#<&:7%8+#A2%B6#/&8%B+#5"#9O&/5:7#<&S"D#7#658D/7:&3%B#C8+2/FE#23#5"37OFG#CiJj&B5D52%8# 9O&/5:7)E#50&G##A;7"D&B5:7B8#A&/&#+, "BF#2"&8#A, 2#:2%B6#87;	O&/5:7)#7"6#J&7D7"#7++&8+&6# +,7+#&;7"D&B5:7B8#,76#+2#7;	O&/5:7#32/#+, WP#9O&/5:7N#24"#3%+%/&#A8B<&SDG##

R2A&; &/)#g7"5&B#H6#J26D&/8#7/D%&8#+,7+#J&7D7"#:22.+&6#7"6#:,7"D&6#+,�&7"5"D#23# M5"+,/2.N8#8.&&:,6%)#J26D&/8#&T.B75"8#+,7+#M5"+,/2.N8#2/5D5"7B#/&782"#32/#D5;5"D#+,.&&:,#A78# <78&6#2"#7#3&7/#+,7+#C+,&#I%/5+7"8#05D,+#"2+#8,2A#+,7+#+,&F#:2%B6#B5;&#%.#+2#+,&#+78P8#23#375+,)# B2;&)#7"6#658:5.B5"&#+,7+#+,&5/#:2;&"7"+#6&07"6&6)E#A,&/&78#J&7D7"#C%/D&6#90&/5:7"8#+2# #7# B2;&G[%] *# J &7D7 "N8#7%65&" : &# ,76#F&+#+2# O 7P# : ,25 : &)#7 "6# ,58#B7 "D%7D%<+BF#5" +5 O 567+&8#+ ,& O # 5"+2#6&:565"D#+2# . /& ;&"+#7#67 "D&/2%8#3%+%/&G^{%#}# 4 B+5 O 7+&BF)# J 26D&/8# : 2" : B%6&8#<F#8+7+5"D#+ ,7+# CiAj ,7+#L25"&6# J &7D7 "N8#7 "6#M5" + ,/2 . N8# : 5+5&8#2 "#7# ,5BB#7 : /288#+ ,58# : ,78 O #23#6533&/&" : &#A78#+ ,&5/# 8& "8#& O <7++B& O & "+ 1 #+ ,&5/#8& "8#7# . &2 . B&#B5 ;5 "D#% "6&/# . /2<7+52 "#7+#7# . /232% "6BF#%/D&" +# O 2 O & "+#5 "# ,58+2/FGE^{%\$}# 4 85 "D#M5" + ,/2 . N8#8 . && : ,)# J &7D7 "#A78#7<B&#+2#3/7 O &#& ;7 "D&B5 : 7B8#78#<2+ ,# P&F#35D%/&8#5"#+ ,#D ,+#+2#87 ; &# 9 O &/5 : 7#78#A&BB#78# . &/8& : %+&6# ;5 :+5 O 86##

$$\begin{split} H_{1}/2\%D_{2}\%H_{2}\%$$

J &7D7"N8# g 7BB78# J &% "52"# 9 / &7#8 . &&: ,)# , " ; 2P&6#+ , +2/F#23#+ , &#^8/7&B5+&8#&"+&/5"D#+ , &# I/2058&6#V7"6#3/20#+,<B"6#6%<<&6#+,%65&":&)#&;7"D&B5:7B8)#C+,":5&"+#I&2.B#+,&# I/2058&66E^{&*}#XF#:7BB5"D#2"#+,&0#C+2#07P%/#B7A8#7"6#D2;&/"0&"+#"2+#2"BF#7#026&B#+2# 07"P5"6)#<%+#7#+&8+70&"+#+2#+,&#A58620#7"6#0&/:F#23#Q26)E[&])#J&7D7"#&T7B+&6#,58#7%65&":"6# .B7:&6#+,&#/&8.2"85<5B5+F#23#:,7"D"+2#+,&OG#H,58#O2;&#A78#:/5+5:7B#+2#J&7D7"N8#/&B7+52"8,5.# A5+, #&;7"D&B5:7B8#<&:7%8+#32/0&6#+, &#/2B&8#+,7+#, "6#, 58#B58+&"&/8#A2%B6#,7; "#+, &5/# /&B7+52"8,5.\#&;7"D&B5:7B#A2%B6#6&3&"6#02/7B5+F#7"6#J&7D7"#A2%B6#</5"D#+,&5/#.2B5+5:7B#7D&"67# +2#3/%5+52"(#J&7D7"#./&8&"+&6#&;7"D&B5:7B8#78#,2B65"D#+,&#.2A&/#+2#6&+&/05"&#A,7+#A78#02/7B)# 7"6#J&7D7"#A78#233&/5"D#,508&B3#78#+,#D%/&#A,2#A2%B6#/&02;&#+,<8+7;B&8#&;7"D&B5;7B8# <&B5&;&6#+,&F#37:&60##

J&7D7"#&0.,785_&6#+,7+#&;7"D&B5:7B8#A&/#D,+5"D#.&/8&:%+52"#7"6#+,7+#1,/58+57"5+F#78#7# A,2B&#A78#2../&88&6G#^"#,58#J&.%<B5:7"#./&856&"+57B#:7"6567:F#7::&.+7":.&&:,#5"#=>Z*)# J&7D7''#:B28&6#<F#6&.7/+5''D#3/20#,58#./&.7/&6#8.&&:,\#,&#''2+&6#+,7+#,&#A78#CA2//5&6E^{&+}#7<2%+# A, &+, &/#2/#"2+#, , 2%B6#87F#A, 7+#A78#2"#, 58#05"6)#A, 5:, #/&; &7B&6#+2#&; 7"D&B5:7B8#+, 7+#J&7D7"# +22#37:&6#2..285+52"#5"#,58#2A"#B53&6#98#,&#.%+#5+)#C^#,7;&#+,2%D,+#23#820&+,5"D#+,7+#58#"2+#7#.7/+# 23#0F#8.&&:,#7"6#^N0#A2//5&6#2;&/#A,&+,&/#^#8,2%B6#62#5+k ^BB#:2"3&88#+,7+#^N;&#<&&"#7#5++B&# 73/756#+2#8%DD&8+#A,7+#^f0#D25"D#+2#8%DD&8+6#^f0#02/I/756#"2+#+26#17"#A&#<&D5"#2%/#:/%876&# L25''&6#+2D&+, &/#5''#7#020&''+#23#85B&''+#./7F&/mE[&], #R&/&)#J&7D7''#3%/+, &/#6&02''8+/7+&6#+2# &;7"D&B5:7B8#+,7+#"2+#2"BF#656#,B82#37:..2"&"+8)#<%+#,58#2..2"&"+8#A&/&#+,ͦN# &;7"D&B5:7B8N#2..2"&"+86#^O.BF5"D#+,7+#,58#7"T5&+F#7/28/2O#,58#3&7/8#+,7+#,&#:2%B6#<&#.%"58,&6# 32/#, 58#A2/68#<F#+, 28"#9 0 &/5:7#+/F5"D#+2#8%<L%D7+&#/&B5D52")# J &7D7"#;7B567+&6#&;7"D&B5:7B#

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:2":&/"8#7"6#3&&B5"D8#23#.&/8&:%+52"G#J&7D7"#:2%B6#/&B7+&#+2#&;7"D&B5:7B8#<&:7%8&#+,&/&#A78#7"+5U /&B5D52%8#]#8.&:535:7BBF)#7"+5U1,/58+57"#]#<578#5"#.2B5+5:8#A,5:,#A78#,5"6&/5"D#J&7D7"#7"6# &;7"D&B5:7B8N#7<5B5+F#+2#B5;"6#8.&7P#3/&&BF6#J&7D7"#/&:2D"5 &6#+,7+#&;7"D&B5:7B8#A&/&# & 0 <7++B&6#7"6#37:&6#7:+5;..285+52")#7"6)#<&:7%8&#+,&/&#A78#7"+5U/&B5D52"#<578#5"#.2B5+5:8)# J&7D7''#A78#7B82#7<B&#+2#%''6&/8+7''6#&;7''D&B5:7B8N#.&/8&:%+52'')#<&:7%8&#,&#,508&B3#A78#37:5''D#+,&# 87 O &G##

H, 58#. &/8&: %+2/F#B7"D%7D&#A78#&8. &: 57BBF#./2"2%": &6#5"#, 58# g 7BB78# J &% "52"#9/&7#8. &&:, \# ,&/&)#J&7D7"#6&35"5+5;&BF#:2"35/0&6#+,7+#&;7"D&B5:7B8#A&/&#.&/8&:%+&6#5"#,58#658:%8852"#23#+,&# :,7BB&"D&8#C\$%6&2U1,/58+57"E#7"6#C+/765+52"7B#;7B%&8E#A&/%:5"D#5"#90&/5:7(^{&#}#O`%7+5"D# C\$%6&2U1,/58+57"E#7"6#C+/765+52"7BE#;7B%&8#7"6#+,&"#8+7+5"D#,58#%",7..5"&88#+,7+#C+/765+52"7B# ;7B%&8E#,7;&#B&3+#.2B5+5:8#7"6#C+/765+52"7B#02/7B#+&7:,5"D8E^{&\$}#,7;&#<&&"#658:/&65+&6)#J&7D7"# &T./&88&6#+,7+#,&#A78#7:+%7BBF#65887+5835&6#+,7+#C\$%6&2U1,/58+57"E#;7B%&8#7"6#O2/7B#+&7:,5"D8# A&/&#"2+#./&8&"+#5"#C.%<B5:#.2B5:F#6&<7+&i8jGE^{&%}##

J &7D7"N8#B7"D%7D2.BF5"D#+,7+#1,/58+57"#;7B%&8#7//7B#;7B%&8#&0<265&8#7# 6&; &B2.0&"+#+,7+#h27,#d&B607"#6&8:/5<&8#78#+,&#C/58#;7B%&8#&;7"D&B5:7B5806E*&#^*#

) d&B607"#+/7:&8#+, &; &B2.0&"+#23#3%"670&"+7B58+#&; 7"D&B5:7B580#5"+2#; 7B%&8# &;7"D&B5:7B58O(&`#H,58#6&;&B2.0&"+#A78#8,7.&6#5"#.7/+#<F#+,&#+/7"8B7+52"#23#:2"8&/;7+5;&# 1,/58+57"#;7B%&8)#+,/2%D,#D/2%.8#B5P&#+,&#S2/7B#S7L2/5+F)#5"+2#D&"&/7B#8&:%B7/5_&6#O2/7B#;7B%&8# +,7+#,76#C07L2/5+7/57"#7..&7BGE^{&(}#9"+5U7<2/+52"#7"6#./2U8:,22BU./7F&/#.285+52"8#A&/A2/:&6# 3/2 0 #+, &5/#/&B5D52%8#% "6&/.5" "5" D8#7 "6#5"8+&76#<&:70 &#.285+52 "8#:&"+&/&6#7/2% "6#02/7B5+F6^{*}# O;7"D&B5:7B8N#/&B5D52%8#<&B5&38#A&/&#"2#B2"D&/#L%8+#/&B5D52%8#<&B5&38K#+,&F#+/7"8:&"6&6#/&B5D52"#

- ![\$>)D(3*!9060*, *&J?&K\$*! ![\$>)D(3*!9060*, *&J?&K\$**!,40&! ![\$>)D(3*!9060*, *&J?&K\$**!,40&!

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7"6)#3/20#+, &#&; 7"D&B5:7B#. &/8. &:+5; &)#A&/&# 02/7B#; 7B%&8#7...B5:7<B&#+2#7BB#23#, % 07"5+F#7"6#A5+, # A,5:,#7BB#.&2.B,2%B6#7D/&&6#0;7"D&B5:7B8#:70&#+2#;5&A#+,&0&8&B;&8#78#%.,2B6&/8#23#02/7B5+F)# 7"6#+, N. &: +8#23#9 0 &/5:7"#: %B+%/"6#D2; &/"0 &"+#A5+, #A,5:, #&;7"D&B5:7B8#656#"2+#7D/&&# <&: 70 &#&; 56&": #9 0 &/5: 7N8#B7: P5"D# 0 2/7B5+FG# 9 665+52"7BBF)#+, &# 4 "5+&6# - +7+&8#D2; &/" 0 &"+N8# . 285+52"#23#"&%+/7B5+F#+2A7/68#/&B5D52"#<&:70&&"#78#7"6#%"6&/8+226#+2#<&#D2;&/"0&"+# 658:/505"7+52"#7D75"8+#/&B5D52"6[']#J&7D7"#6&02"8+/7+&6#+,58#8,53+#<F#:B7505"D#+,7+#+,&#:%//&"+# D2;&/"O&"+#7"6#:2"+&O.2/7/F#.2B5+5:57"8#<&B5&;&6#+,7+#C7"F#.%<B5:#.2B5:F#7../27:,# 5": 2/. 2/7+5"D#+/765+52"7B#; 7B%&8#58#2%+#23#<2%"680E '+#X&: 7%8&#/&B5D52")#3/2 0 #+, &#. &/8. &:+5; #+, &# <%665"D#1,/58+57"#J5D,+)#A78#+,R%/:#02/7B#;7B%&8)#+,&#D2;&/"0&"+#7:+5;&BF#"2+# 7::200267+5"D#/&B5D52%8#C/5D,+8E#2/#/&B5D52%8BF#<78&6#2.5"52"8#2"#02/7B5+F#A78#%"6&/8+226#78# +,&#D2;&/"O&"+#B7:P5"D#O2/7B5+F#7"6#.&/8&:%+5"D#/&B5D52"G##

R2A&; &/)#+, &#, &7/+#23#J &7D7"N8#: 2""&:+52"#A5+, #&; 7"D&B5: 7B8#656#"2+#: 20/20#, 58# &O.,7858#2"#+,&#;7B%&#,WA#5"#&;7"D&B5:7B#<&&B5&38)#&;7"D&B5:7B8#+,&O8&B;&8)#2/#&;7"D&B5:7B8N# /2B"#.2B5+5:8K#5"8+&76)#5+#A78#D/2%"6&6#%.2"#3&7/8#23#8&:%B7/580#7"6#+,F0<52+5:#/&B7+52"8,5.# +, 7+#, &#&T.B75''&6#, ''6#&; 7''D&B5:7B8#:2%B6#, 7; &G#R58#/&3&/&'': &8#+2#8&:%B7/58O#78#7#+, /&7+#<&D7''# 78#&7/BF#78#=>Z*)#<%+#+,&F#A&/&#.7/+5:%B7/BF#./2"2%":&6#5"#,58#=>Z@#CO;5B#O0.5/&E#8.&&:,G# J &7D7"#.B75"BF#7B5D"&6#,508&B3#A5+,#&;7"D&B5:7B8#A,&"#,&#:B750&6#+,7+#C026&/"U67F#8&:%B7/580E# A78#C5"#2..285+52"#+2 k %86E`+# J &7D7"#.B7:&6#8&:%B7/58 0#8+7%":,BF#5"#2..285+52"#+2#,508&B3)#,58# 7%65&": &)#7"6#+, &#A, 2B#90&/5:7#<&:7%8&:%B7/580#C658:7/6i&6j#+, &#+/5&6#7"6#+50&U+&8+&6# ;78%&8#%.2"#A,5:,#2%/#;&/F#:5;585 7+52"#iA78j#<78&6GE^{*#}#J&7D7"N8#3/705"D#8&:%B7/580#78# 5":20.7+5<B&#A5+,#+,&#C;7B%&8 k #i2"#A,5:, j#2%/k :5;5B5_7+52"#iA78j#<78&6E^{`\$}#076&:%B7/580#

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 $[\]begin{array}{l} \overset{(\#_1)}{=} & (M_3^{*1} \land M_3^{*1} \land$ ^{\$}!"\$(M(3*!_^%=>!^D;=<\$*_!:;\$\$9?*!n#=9\$:!#F!P\$D#9<(91&

5": 2 0 . 7+5<B&#A5+, #9 0 &/5: 7#2 "#7#3% "67 0 &"+7B#B&; &BG# J &7D7 "#7/D%&6#+, 7+)#6&8 . 5+&: %B7/58+8N# :B75 0 5"D#+, 7+#C+, &FN//&&5"D#i 9 0 &/5:7"8j#3/2 0 #8% . &/8+5+52"8#23#+, &# . 78+)E^{'*}#5"#/&7B5+F)#C+, &FN; &# +7P&"#%.2"#+,&08&B;&8#+,&#L2<#23#8%.&/5"+&"65"D#i90&/5:7"8j#<F#D2;&/"0&"+#/%B"6# /&D%B7+52"E'"6#,7;%BB&"#+2#:2//%.+52"#7"6#7%+,2/5+7/57"580K#+,58#./&8&"+&6#8&:%B7/58+8#78# 2;&/<&7/5"D#7"6#A7"+5"D#:20.B&+&#D2;&/"0&"+#:2"+/2B#2;&/#+,&#.&2.B&&#J&7D7"#50.B5&&6#+,7+)# %''6&/#7#8&:%B7/58+#D2;&/''O&''+)#+,&#.&2.B>''N+#,7;#;25:''6#+,&#D2;&/''O&''+#62&8''N+#B58+&''# +2#+, &#, &2, B&G# 9 0 &/5:7"#&:7"D&B5:7B8#P"&A#+,7+#7#D2:&/"0&"+#+,7+#62&8"N+#B58+&"#+2#+,&#:25:# +,&#.&2.B&#A78#<B7+7"+BF#%"U90&/5:7"G##

R2A&: &//#J&7D7"#656#"2+#:20.B&+&BF#:5B53F#90&/5:7"#8&:%B7/58+86#R:P"2AB&6D&6#+.7+# +,&F#A&/&#''2+#7#C07L2/5+FE`'#23#90&/5:7''8)#7''6#:2'':&6&6#+,7+)#+,2%D,#+,&F#07F#<&#CA&BBU 5"+&"+52"&6)#+, &5/#; 7B%F8+&0 #58#/765: 7BBF#6533&/&"+#3/20#+, 7+#23#028+#90&/5:7"8)E'(#A,5:,)#78#7# /&8%B+)#6&.5:+&6#9 0&/5:7"#8&:%B7/58+8#78#02/:D%56&6#+,7"#&;5B0#h2"&+,&B&88)#9 0&/5:7"# 8&: %B7/58+#5"65;56%7B8N#058. &/: &.+52"#656#"2+#+7PA7F#3/20#+, C"D&/#23#8&: %B7/580N8#+F/7""F# A5+, 5"#7#D2:&/" 0 & "+#2/#82:5&+F6# J & 7D7"#. 2/+/7F&6#8&:%B7/58 0#78#<578&6#7D75"8+#/&B5D52"#7"6#+.&# +/765+52"7B#;7B%&8#+,7+#<%5B+#90&/5:7)#A,5:,#.B7:&6#8&:%B7/580#5"#2..285+52"#+2#"2+#2"BF#90&/5:7# <%+#7B82#&;7"D&B5:7B8G##

X&D5" "5"D#7/2% "6#+, +7/+#23# J &7D7" N8#35/8+#. / &856&": F#7"6#D/2A5"D#+, /2%D, 2%+#, 58#+50&# 5''#2335:&)#7<2/+52''#<&D7''#+2#/58''#&;7''D&B5:7B8N#:%B+%/7B#7A7/&''&886(*#J&7D7'')#5''#+%/'')#%8&6#+,&# 588%#7<2/+52"#78#7"#&T70.B#<2+,#+,C"D&/8#+,7+#8&:%B7/580#.28&8#+2#90&/5:7"#82:5&+F# 7"6#+, &# 058+7P&8#+2#A,5:, #8&:%B7/580#8&7686#^"#,58#=>Z@#CO;5B#O0.5/&E#8.&&:,)#,&#&0..785&6# +,&#D226#5"+&"+52"8#23#+,&#.&2.B&#A,2#:/&7+&6#7<2/+52"#:B5"5:8#<%+#,5D,B5D,+&6#+,7+)#:%//&"+BF)#

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³: 83)<\$Z!" & f\$Z=:*1:#, & 203#+&:;) & 1&014/\$1-,)6(+06, & /#)0-+0(1&5\$%+0"-, & C\$>&BJ\$)+0\$1&:)(1-\$\$\$)<, *&#, & /, `%;), & N()-!!3&; & H(DQC=)M\$!. G!!46-07!

+ , &&&#:B5"5:8#A&/&#<2A5"D#+2#+, &# . /&&88%/&#8&:%B7/58 O (# J &7D7"#788&/+&6#+, 7+#+, &&&#:B5"5:8#A&/&# 5D"2/5"D#+, &#/2B&#C 0 2/7B5+F#i .B7F8j k 5"#+, %<L&:+#23#8&T^OE#7"6#./2 0 2+5"D#<5/+, #: 2"+/2B#6/%D8# 7"6#6&;5:&&#A5+, 2%+#.7/&"+7B#P"2AB&6D&)#A,5:, #A78#7BB2A5"D#8&T#+2#<&:2 0 &#+22#"2/07B5_&60# J &7D7"#<&B5&;&6#+,7+#.7/&"+8#,76#7#/5D,+#+2#:2%"8&B#+, &5/#:,5B6/&"#2"#02/7B5+F#7"6#+,7+#.7/&"+8# 8, 2%B6#<BB2A&6#+2#:2"+/2B#+, &#,7...&"5"D8#23#+, &5/#:,5B6/&"%8#B5;&8#A5+,2%+#2<8+/%:+52"#3/2 0# &T+&/"7B#82%/:&&#B5P&#+,&#D2;&/"0&"+6# J &7D7"#%"6&/8+226#C3/&&62 0)E⁽⁺#7#:2 0 0 2"BF#+2%+&6# 9 0&/5:7"#;7B%&)#78#./28.&/5"D#CA,&"#/&B5D52"#58#;5</7"+#7"6#+,&#/%B#87A#%"6&/#Q26#58# 7:P"2AB&6D&66E⁽⁻#J &7D7"#./&8&"+&6#5"+/%852"8#2"#3705BF#7"6#.7/&"+7B#/5D,+8#78#7"#7++&0.+#+2# :2&/:&#F2%"D#.&2.B"+2#<&:2 05"D#&&:%B7/#7"6#+2#8&&/#+,&9 0&/5:7"#6&02:/7:F)E^{(#}#A,5:,#+,%8# C+/765+52"7B#;7B%&8#7"6#&;&"#7</2D7+&#+,/5D5"7B#+&/08#23#9 0&/5:7"#6&02:/7:F)E^{(#}#A,5:,#+,%8# 5/%B6#

9B028+#78#822"#78#, &#A2"#+, &#"205"7+52"#78#+, &#J&.%<B5:7"#./&856&"+57B#:7"6567+&)# J&7D7"#A2/P&6#+2#35+#+, &#g&02:/7+5:#I7/+F#5"+2#+, 58#"7//7+5; &#+, 7+#8&:%B7/580#+, /&7+&"&6# 90&/5:70#J&7D7"#&0<2B6&"&6#, 58#7%65&":&#+2#35D, +#<7:P#7"6#2..28&#+, &#Cg&02:/7+5:#.7/+F# B&76&/8, 5.E#<&:7%8&#+, &F#, 76#375B&6#5"#+, &5/#C.2B5+5:7B)#.&/82"7B)#7"6#02/7B#/&8.2"85<5B5+5&8E#+2#+, &# 90&/5:7"#.&2.B"6#, 76#+, %8#:/&7+&6#CD/7; &#+, /&7+8#+2#i+, Z&/5:7"j#&T58+&":&0E(\$#R&# &T.B75"&6#+, 7+#90&/5:7"8#:2%B6#"2+#850.BF#, 2.&#+, /+&/#7605"58+/7+52"#A2%B6#62#A, 7+#A78# <&8+#32/#+, &0#<&:7%8&#+, /+&/#7605"58+/7+52"#A78#7#C+/%8+#0&E(\$#D2; &/"0&"+6#9#C+/%8+#0&E# D2; &/"0&"+#0&7"8#+, 7+#+, %+, 2/5+7+5; &#.2A&/#/&8+8#82B&BF#A5+, #+, &#./&856&"+)#<%##.

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^{)&}lt;sup>\$</sup>!"\$(M(3^{*}!_^%):^D;=<\$*_!:;\$\$9?*!n#=9\$:!#F!P\$D#9<(91&

^{)&}lt;sup>5</sup>!"\$(M(3[!]]_\$;CQ>=9(3!k(!=#3(>^{*}]:;\$\$9?^{*}!"#3(>)!"\$(M(3!G<\$:=)\$3!=(>!f=Q<(<I!1!XC:\$CD!!

^{)&}lt;sup>&</sup>! "\$(M(3*!_"\$;CQ>=9(3!k(!=#3(>*_!:;\$\$9?*!"#3(>)!"\$(M(3!G<\$:=)\$3!=(>!f=Q<(<I!1!XC:\$CD!!

62&8"N+#B58+&"#+2#7"F#2.5"52"8#2+, &/#+, 7"#, 58#2A"6#J&7D7"#&88&"+57BBF#50.B5&6#+, /+&/# 7605"58+/7+52"#A78#7"#7%+,2/5+7/57"#/&D50&6#17/+&/#7"6#,58#7605"58+/7+52"#;52B7+&6#+,&# 3%"670&"+7B#./5":5.B&8#23#+,"5+&6#-+7+&8#<&:7%8/+&/#,76#"2+#%.,&B6#,58#C/&8.2"85<5B5+5&8E^{(&}# +2#7:+#5"#+, &#<&&+#5"+&/&&+8#23#+, &# . &2 . B&G#H, &# 17/+&/#7605"58+/7+52"#, 76#. %+#+, Z&/5:7"#. &2 . B&# 5"#67"D&/#<&:7%8+#/&8+/5:+&6#,2A#+,Z&/5:7"#.&2.B&#A&/<B&#+2#C2/6&/#+,&5/#B5;&8)E(`#A,5:,# 7B82#50.B5&6#+,7+#+,/+&/#7605"58+/7+52"#,76#7#8.&:535:#7D&"67#32/#,2A#+,Z&/5:7"#.&2.B&# 8,2%B6#<&#B5;5"D#+,&5/#B5;&86#J&7D7"#./2.28&6#+,7+)#5"8+&76#23#+/%8+5"D#5"#2"&#+7"D5<B&#.285+52"#23# .2A&/#2/#.&/82")#90&/5:7"8#8,2%B6#+/%8+#5"#C+,28&#;7B%&8#+,7+#+/7"8:&"6#.&/82"8#7"6#.7/+5&8GE((# H,58#A2%B6#+,&"#D5;&#+,&#.2A&/#23#L%6D0&"+#<7:P#+2#+,&#.&2.B&)#7"6#32/:&#.2B5+5:7B#B&76&/8#+2#+,&# 8%<2/65"7+&#/7"P#78#+, &F#7++&O.+&6#+2#B5; &#%.#+2#7"6#%., 2B6#C+, 28&#; 7B%&8E#32/#+, &#.&2.B&G#d2/# J&7D7"N8#7%65&":&)#+,58#O&7"+#D5;5"D#<7:P#.2A&/#+2#&;7"D&B5:7B8#<&:7%8&#+,&F#A&/&#+,"BF# 2"&8#A, 2#A&/<B&#+2#07P/7BBF#:2//&:+#L%6D0&"+86# J &7D7"#A7"+&6#+2#C07P# :2005+0&"+k+2#+&7:,#2%/#:,5B6/&"#+,&#;7B%&8#7"6#;5/+%&8#,7"6&6#62A"#+2#%8#<F#2%/# 37 O 585&8)E^{)**}#7 "6#&T. B75"&6#+, 7+)#% "6&/#7# J &7D7"#76 O 5"58+/7+52")#+, %/;5; 7B#23#+, 	 O &/5:7"# A7F#23#B53&#A2%B6#<&#./&8&/;&60#XF#6&8:/5<5"D#C;7B%&8#7"6#;5/+%&8E#78#C,7"6&6#62A")E#J&7D7"# 6/&A#7#:2""&:+52"#+2#C+/765+52"7B#;7B%&8E#A,5:,)#<&D5""5"D#5"#,58#=>Z*#g7BB78#J&%"52"#9/&7# 8.&&:,)#,&#%8&6#5"+&/:,7"D&7<BF#A5+,#/&B5D52%8#;7B%&86#

J & O 7/P7<BF)#<F#:, 7/7:+&/5_5"D#8&:%B7/58 O #78#+, "+5+, &858#23#9 O &/5:7#7"6#+F5"D# 8&:%B7/58 O #+2#+, /+&/#9605"58+/7+52")#J &7D7"#A78#7<B&#+2#.2/+/7F#+, &#&;7"D&B5:7B#\$50 O F#

M, 5B&#J&7D7"#.285+52"&6#820Z&/5:7"#8&:%B7/58+8#78#,7/03%B#<%+#A&BBU5"+&"+52"&6)#,&# 656#"2+#&T+&"6#7"F#23#+,7+#:2%/+&8F#+2#:200%"580)#A,5:,#,/70&6#78#+,&/+BF#07B5:52%8#7"6# .7/03%B#& 0<2650&"+#23#8&:%B7/580G#XF#+, &#+50&# J &7D7"#D7:&#+, &#CO:5B#O0.5/&E#8.&&:.#5"# S 7/:.# 23#=>Z@)#, &#, 76#.5".25"+&6#:200%"580#78#+, &#D/&7+&8+#67"D&/#+2#90&/5:7"#B53&#<&:7%8+# & . 5+2 O 5_&6#8&: %B7/58 O G# J &7D7''#8 . & ''+# O % : , #23#+ , &#<&D5'' ''5''D#8&: +52''8#23# , 58#CO ; 5B#O O . 5/&E# 8. &&: , #&` %7+5"D#/&B5D52"#A5+, #02/7B5+F#7"6#7335/05"D#/&B5D52"#78#+, RB%+, 2/5+F#2"#02/7B5+FG# H, 58#&"7<B&6#, 50)#78#, &#<&D7"#+7BP5"D#7<2%+#:200%"580)#+2#8, 2A#+, 7+#<&:7%8&#:200%"580#A78# 7D75"8+#7BB#/&B5D52%8#02/7B8)#:200%"580#+,%8#,76#"2#02/7B86#1200%"580#5"#90&/5:7#A78# 67"D&/2%8#<&:7%8Z&/5:7#7B/&76F#8+/%DDB&6#A5+,#5":2/.2/7+5"D#02/7B8#5"+2#D2;&/"0&"+)#<%+#53# 9 0 &/5:7#A&/&#+2#<&:2 0 &#:2 0 0%"58+)#7"F#, 2 . /#9 0 &/5:7N8#A&BBU<&5"D)#A, 5:, #A78#82#6&&.BF# 6&. & "6&"+#2"#02/7B5+F#7"6#/&B5D52")#A2%B6#<&#&B505"7+&66#J&7D7"#:B28&6#,58#C0;5B#O0.5/&E# 8. &&: ,#A5+,#7#8+2/F#7<2%+#7#37+, &/#A, 2#A2%B6#/7+, &/#, 58#67%D, +&/8#65&#F2% "D#<&B5&;5"D#5"#Q26# 5''8+&76#23#6F5''D#2B6#5''#7#:200%''58+#A2/B6#A,&/&#+,&F#A2%B6#''2+#<<B&#+2#<&B5&;''#Q260'*## H,58#<B7:PU7"6UA,5+&#;5&A#23#+,&#/&B7+52"8,5.#<&+A&&"#:200%"580#7"6#/&B5D52"#8,2A&6# J&7D7"N8#7%65&":&#+,7+#7#8&:%B7/58+#D2;&/"O&"+)#&GDG)#7#:2OO%"58+#2"&)#A78#+,&#%B+5O7+C"D&/# +2#+, &5/#3/&&#B5; &8#7"6#53#:200%"580#:70&#+2#90&/5:7)#"2#2"&)#&8.&:57BBF#1, /58+57"8)#A2%B6#<&# 873&G#4 "6&/#:200%"580)#.7/&"+8#A2%B6#,7;&#"2#/5D,+8)#:,5B6/&"#A2%B6#,7;&#"2#/5D,+8)#7"6# /&B5D52 "#A2%B6#<&# . &/&& : %+&6G# J &7D7 "#%/D&6# , 58#7%65&" : &#+2#<&# ; 5D5B7 "+#7D75 "8+#C` %5&+# O & "E^{)*\$}# A, 2#05D, +#+7BP#7<2%+#3/&&620#<%+#62"N+#/&7BBF#./2+&:+#5+)#0&7"5"D#8&:%B7/58+8#7"6#:200%"58+86# d2/#J&7D7")#+, +/%DDBD75"8+#:200%"580#A78#7#02/7B#2""6#<&:7%8&#:200%"580#A78# 6&; 256#23#02/7B8)#, 2.B5&6#+, 7+#5+#A2%B6#<ᎊ/7B#32/#90&/5:7"8#+2#"2+#6&"2%":"6# 2...28&#:200%"580G###

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J &7D7"#/&:2D"5 &6#+, 2.2/+7":#35D, +5"D#32/#02/7B5+F#<%+#<&B5&; &6#+, "%8#A78#2"# ,58#7%65&": &#+2#%.,2B6#5+6# J &7D7"#.25"+&6#+2#9 0 &/5:7N8#,58+2/F#78#7#./5 0 &#&T7 0 .B#5+8# C:7.7:5+F#32/#+/7"8:&"65"D#+,/7B#&;5B8E#D5;&"#+,%:+#+,7+#+,+/56&8#90&/5:7#,76#076 /# C&`%7B#/5D,+8E#A78#7#.25"+#23#C./56 /#7BB#90&/5:7"8E^{)*%}#&;&"#53)#6%/5"D#+,28+/56&8)#+,&/&#A78# C658% "5+FGE^{)*&#} J &7D7 "#, &/&#& "62/8&6#+, 28"#, 58#7%65&": &#A, 2#A&/#D, +5"D#32/#7"+5U7<2/+52"# 7"6#./2U3705BF#/5D,+8G#9665+52"7BBF)#,Ყ/0&6#+,7+#,58#7%65&":&#A78#"2+#2"BF#2"#+,&#:2//&:+# 856#.58+2/F#<%+#7B82#5"+&D/7B#+2#P&&.5"D#9.0&/5:7#2"#5+8#./2.&/#:2%/8&G#O:&"#+.2%D.#2+.&/# 9 0 &/5:7"8#2..28&#+, & 0 #"2A)#&;7"D&B5:7B8#"&&6&6#+2#P&&.#35D,+5"D#32/#+, &5/#<&B5&38#<&:7%8&#+, &F# 7B2''&#: 2%B6#. /2+&:+#7''6#D%56	 0 &/5: 7N8#3%+%/&0#^''#625''D#+, 7+)# J &7D7''#. 285+52''&6#, 58#7%65&'': N# ,58#,&B.&/8#7"6#+,"&8#A,2#0%8+#<&7/#+,&#<%/6&"#23#%.,2B65"D#02/7B5+FG#

O;7"D&B5:7B8#,76#+,&#/&8.2"85<5B5+F#23#87;5"D#7"6#./2.7D7+5"D#O2/7B5+F#5"#90&/5:7"# 82:5&+F)#7"6#J&7D7"#233&/&6#,508&B3#+2#+,&0#78#+,&#.2B5+5:57"#A,2#A2%B6#./2+&:+#+,&5/#5"+&/&8+8#5"# D2;&/"O&"+6#J&7D7"#<&B5&;&6#+,7+#Q26#,76#<B&88&6#9O&/5:7)#7"6#82#+,&#.&2.B&#O%8+#+,&/&32/&# ;2+&#+2#./2+&:+#+,&#C<B&885"D8E#23#Q26#C32/#2%/#:,5B6/&"GE)*'#R+/&88&6#+,2.2/+7":#,58# &;7"D&B5:7B#7%65&":&#<&:7%8"BF#+,&F#:2%B6#C./2+&:+#+,Z&/5:7"#3705BF#7"6#/&8.&:+#5+8# 5"+&/&8+#5" k .%<5:#.2B5:F6E)*(#^3#&:7"D&B5:7B8#656#"2+#32/#820&2"&#A,2#A2%B6#./2+&:+#+,&5/# ;7B%&8)#+,&/&#A2%B6#<&#"2#2""#D2;&/"O&"+#+2#C6&3&"6#+,&3&"8&B&88#7"6#+,&#A&7P)#+,&#;&/F# F2% "D)#+, &#. 22/)#7 "6#+, &#; &/F#2B6GE^{))*}#J&7D7 "#656#"2+#+/F#+2#:2";5": &#&;7"D&B5:7B8#+,7+#, &#A78# C2"#+, & O KE#5"8+&76)#, &#.B7:&6#&; 7"D&B5:7B8#85O%B+7"&2%8BF#78#, 58)#78#A&BB#78#9 O &/5:7N8)# CO2/7B#:2O.7886E⁾⁾⁾#J&7D7"#A2%B6#D5;&#&;7"D&B5:7B8N#<&B5&38)#;7B%&8)#7"6#D27B8#7#/2B"#.%<B5:# . 2B5: F#7"6#. 2B5+5:86#!": &#, &#A78#5"#D2; &/"0&"+)#J&7D7"#A2%B6#756#&; 7"D&B5:7B8#5"#6&3&"65"D#

^{*!&}quot;\$(M(3*! ^%=>!^D;=<\$* !:;\$\$9?*!n#=9\$:!#F!P\$D#9<(9Ik

^{!*'}!"\$(M(3*!_^%=>!^D;=<\$*_!:;\$\$9?*!n#=9\$:!#F!P\$D#9<(9Ik !*(! "\$(M(3*!_k(@=#3(>!8FF(=<:k_!

^{!*)}! "\$(M(3*!_k (!=#3(>!8FF(=<:k_!

^{!!*!&}quot;\$(M(3*! k(@#3(>!8FF(=<:&

D/&7+E#<&: 7%8&#+, &F#P&. +#9 0 &/5:7#CD226^{(E))\$}#R&#&T.B75''&6#+, 7+#&; 7''D&B5:7B8#:2%B6#. /2+&:+# 9 0 &/5:7"# 0 2/7B5+F#<F#P&&.5"D#.2B5+5:57"8#C 0 5"63%B#23#+, 8&78#7"6#+, &#./5":5.B&8#+, 7+#</2%D, +# i 9 0 &/5: 7 i #5"+2#+, &# . %<B5: #7/&" 7#5" #+, #/8+# . B7: &GE^{))%}# J &7D7" #A78#"2+#7" #&; 7" D&B5: 7B)#<%+#, &#A78# 8&B3U7A7/"6#:2";5":&6#23#&;7"D&B5:7B8N#50.2/+7":&#+2#90&/5:7)#A,5:,#5"65:7+&6#+2# &;7"D&B5:7B8#+,7+#+,&F#:2%B6#+/%8+#,50G#R&#A78#7<B&#+2#L2P<2%+#+,&#:2//%.+52"#23#.2B5+5:57"8# <&: 7%8&#,&#: 2%B6#8&&#: 2B5+5:57"8#:B&7/BF#7"6#, 76#"2+#<&&"#5"62:+/5"7+&6#<F#8&:%B7/5800#H, &#C56&78# 7"6#./5":5.B&8E#+2#A,5:,#,&#/&3&//&6#A&/&#+,&#C+/765+52"7B#;7B%&8E#,&#,76#./&;52%8BF#&8+7<B58,&6# 78#/&B5D52%8#;7B%&80#X&:7%8"BF#+,%65&":&N8#CA2/P#7"6#./7F&/8E#A5BB#7BB2A#90&/5:7#+2# C8%/;5;&#+,58#.&/5B2%8#:&''+%/F#7''6#P&&.#7B5;&#+,58#&T.&/5O&''+#5''#B5<&/+F)#+,58#B78+)#<&8+#,2.# 07")E⁾*J&7D7"#.%+#+,&#<%/6&"#23#02/7B5+F#2"+2#&;7"D&B5:7B8)#"2+#,508&B36#O;7"D&B5:7B8#:2%B6# 7"6#+, %8#0%8+#87;Z&/5:7#7"6#90&/5:7"#;7B%&8#3/20#8&:%B7/#7++7:P86#J&7D7"#:2%B6#,&B.#+,&O# 3/2 0 #A5+, 5"#+, &#D2; &/" 0 &" +K#, &#: 2%B6#<&#+, &5/#. 25" +#. &/82"#78#. /&856&" +G# J &7D7"#: B75 0 &6#+, 7+#53# &;7"D&B5:7B#656#"2+#./2+&:+#9 0 &/5:7#7D75"8+#8&:%B7/58 0)#"2#2"&#&B8&#A2%B6)#7"6#53#9 0 &/5:7#B28+# +,#D,+#7D75''8+#8&:%B7/58O)#7BB#C,2.&E#A78#B28+#32/#+,%+%/#7BB#,%O7''8G#J&7D7''#<&B5&;&6# +, 7+#9 0 &/5 : 7#A78#A2/+, #35D, +5 "D#32/)#7 "6#82)#53#&; 7 "D&B5 : 7B8#8% . . 2/+&6# J &7D7 "#32/# . /&856& "+)#, &)# 5"#+%/")#A2%B6#8%..2/+#+,&5/#35D,+#7"6#&332/+86##

O;7"D&B5:7B8#%.,&B6#+,&5/#856#+,&#/&B7+52"8,5.#7"6#O75"+75"&6#+,&5/#8%..2/+#32/#J&7D7"# +,/2%D,2%+#,58#./&856&"+57B#:7/&&/)#7"6#J&7D7")#5"#+%/")#A2/P&6#+2#62#,58#.7/+6#J&7D7"N8#CO;5B# OO.5/&E#8.&&:,#A78#D5;&"#8&;&/7B#F&7/8#73+&/#,&#A2"#+,&#=>Z*#&B&:+52")#7"6#5"#5+)#,&#&T.B75"&6# ,2A#,&#,76#,2"2/&6#,58#:2OO5+O&"+8#+2#+,&#/&B7+52"8,5.#,"6#&;7"D&B5:7B8#,766#O;7"D&B5:7B8# ,&B6#+,7+#+,&#D2;&/"O&"+N8#<7""5"D#./7F&/#5"#8:,22B)#A78#/&./&8&"+7+5;#+,&#D2;&/"O&"+# 658:/505"7+5"D#7D75"8+#C/&B5D52%8#8.&&:,)E^{))'}#7"6#D5;5"D#5"+2#+,"3B%&":#8&:%B7/58O6#X&:7%8&# J&7D7"#:B75O&6#+,7+#,&#C8&"+#+,"D/&88#7#:2"8+5+%+52"7B#7O&"6O&"+#+2#/&8+2/&#./7F&/#+2#.%<B5:# 8:,22B8 k #+2#B&+#i9O&/5:7N8j#:,5B6/&"#./7F)E^{))(#},,2A&6#+,7+#,&#A78#32BB2A5"D#+,/2%D,#2"# D&++5"D#7"6#8%..2/+5"D#82B%+52"8#+2#&;7"D&B5:7B8N#:2":&/"86#O;7"D&B5:7B8#<&B5&;&6#5"#+,&# 5O.2/+7":#./7F&/#5"#8:,22B#<&:7%8&#P&&.5"D#./7F&/#5"#8:,22B#P&&.8#9O&/5:7#O2/7B)#7"6# J&7D7")#/&D7/6B&88#23#,58#2A"#.&/82"7B#2.5"52"8)#,76#7++&O.+&6#+2#</5"D#+,&5/#A5BB#+2#/&7B5+F6##

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 $[\]label{eq:states} \begin{array}{l} \overset{!!(!)}{=} & (M(3^{*}!_{m}) = 0; =<^{*}!; $$9?^{*}!n = 9$:!#F!P$D=9<(91!) \\ \overset{!!(!)}{=} & (M(3^{*}!_{m}) = 0; =<^{*}!; $$9?^{*}!n = 9$:!#F!P$D=9<(91!) \\ \end{array}$

I7%B#M&F/5:,)#7#:2"8&/;7+5;&#.2B5+5:57"#3/20#M58:2"85")#.&/:&5;&6#+,&#.2885<5B5+F#23# D7B;7"5 5"D#:2"8&/;7+5;&#&;7"D&B5:7B8#A,2#A&/&#%",7..F#A5+,#D2;&/"O&"+#5":%/852"8#5"+2#+,&# /&7B 0 #23#8&D/&D7+&6#8:,22B86#M&F/5:,#A7"+&6#+2#07P&#&;7"D&B5:7B8)#78#7#D/2%.)#7#/&B57<B&#;2+&/# <78 /#+,&#J&.%<85:7"#.7/+F6^{),,}#R2A&;&/#+,&#O&:,7"58O#+,7+#M&F/5:,#%8&6#+2#7:+5;7+&#+,58# /&B5D52%8#:200%"5+F#A78#"2+#8&D/&D7+52"#<%+#820&+,5"D#;&/F#6533&/&"+\\#7<2/+52"G#9<2/+52"#A78# "2+#7#:&"+/7B#588% /#&;7"D&B5:7B8K#%.#%"+5B#+,&#B7+&#=>?*8#7<2/+52"#A78#:2"856&/&6#+2#<# C17+, 2B5:#588%&GE^{),#}#S28+#&;7"D&B5:7B#B&76&/8#./52/#+2#7"6#822"#73+&/# &5+. &/#656#"2+#8&&# 7<2/+52"#78#02/7BBF#A/2"D#2/#656#"2+#:7/&G^{),\$}#O;&"#53#7#B&76&/#/&:2D"5 &6#+,&#.2+&"+57B#32/# 7<2/+52"#+2#,7;/7B#:2"8&`%&":&8)#588%&8#B5P๹BF#.B7""5"D#7"6#7#./&D"7"+#.&/82"N8#,&7B+,# A&/+&''#23#7#,5D,&/#02/7B#./52/5+FG^{),%}#H,&# #&:&"#8756)#32BB2A5"D#

+,&# #6&:5852"#=>?@)#+,7+#C/&B5D52%8#B5<&/+F)#,%07"#&`%7B5+F)#7"6#L%8+5:/&#

76;7":&6#<F#+,&#-%./&O%/+#7<2/+52"#6&:5852"GE#X7BO&/#6&8:/5<&8#M&F/5:,N8#:,7BB&"D&\##

O;7"D&B5:7B"#+,&#B7+&#=>*8#7"6#+,/2%D,2%+#O28+#23#+,&#=>?*8#<F#7"6#B7/D&#/&3%&&6#+2# 8&<2/+52"#78#7#6&35"5"D#588%&)#0%:,#B&88#7#07++&/#+,7+#A2%B6#8%002"#+,&0#+2#+,/2"+# B5"&8#23#.2B5+5:7B#7:+5;580G#9<2/+52"#850.BF#375B&6#+2#D75"#i"&D7+5;&i#+/7:+52"#702"D# &;7"D&B5:7B8 k #H,&/A,&BO5"D#/&8.2"8&#+2# #2"#+, &#.7/+#23#&;7"D&B5:7B8# A78#85B&": &)#7"6#+, &#; 25: &8#+, 7+#8. 2P"#+, &# 07++&/#A&/ 0 <5; 7B&"+6^{), &}#

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g &8 .5+&#+, % : +#+, 7+#<2+, # 7"6#+, &#^J - # . 2B5 : F# : 7 0 %/5"D# h 5T2 "N8#76 0 5"58+/7+52")# 5+#**A**78#17/+&/#**A**,2#**A**78#8.%/''&6#<F#&;7''D&B5:7B80#9#P&F#37:+2/#5''#+,7+#8.%//5''D#**A**78#+,&#:78#**X**2<# \$2"&8#4"5;&/85+F)#2"#+,+#./205"&"+#7"6#5"3B%&"+57B#&;7"D&B5:7B#7:76&05&8#5"#90&/5:76# ! "#\$7"%7/F#=>)#=>?\)#+,&#^J -)#73+&/#F&7/8#23#A7/"5"D)#/&8:5"6&6#X2<#\$2"&8#4"5;&/85+FN8#+7TU &T&0.+#8+7+%8)^{)#%}#<%+#+,58#&;&"+#656#"2+#,7..&"#%"6&/#17/+&/\#5+#A78#6%/5"D#d2/6N8#7605"58+/7+52"# 7"#&"+5/&#F&7/#7"6#2"CF#<&32//+&/#A78#&;&"#5"7%D%/7+&6#2"#\$7"%7/F#'*)#=>??@#4"&78&#,76#

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23#C/5D, +8E#& O &/D5"D#7/2%"6#+,58#+5 O +/&"D+, &"&6#: 2"8&/;7+5; &# 1,/58+57"8N#8&"8&#+,7+#+, &F#A&/&# <&: 2 O 5"D#7# 0 5" 2/5+F#. 2.%B7+52"#A5+,5"#9 O &/5:7"#82:5&+F#7"6#A&/&#+,%8#&"+5+B&6#+2#D/&7+&/# : 2"8+5+%+52"7B#./2+&:+52"86³*#9#/5D, +#58#7#C:2"8+5+%+52"7B#D%7/7"+&&E#7"6#58#+,%8#./2+&:+&6#<F#+,&# D2; &/" O &"+6³*#R2A&; &/)#78#V&A58#&T.B75"8)#7# O 2/7B#CA/2"DE³##62&8#"2+#,7; &#B&D7B# C./&:&6&":&)E^{3\$\$}#2; &/#C/5D, +8#7"6#L%8+5:&E^{3\$\$}# O &7"5"D#+,7+#53#82 O &+,5"D#58#%"6&/8+226#78#2"BF# 50 O 2/7B#7"6#"2+#:2""&:+&6#+2#7#:2"8+5+%+52"7B#/5D,+)#+, &#D2; &/" O &"+#:7""2+#./2+&:+#5+#2; &/# 82 O &+,5"D#+,7+#58#:2""&:+&6#+2#7#:2"8+5+%+52"7B#/5D,+0#H, &#D2; &/" O &"+#:7""2+#./2+&:+#5+#2; &/# 87 "D%7D&#+2#:2""&:+#+,"+5U7<2/+52"# O 2/7B#7/D% O &"+#+2#+,&#C/5D,+U+2UB53&E⁻³/D% O &"+6#^"#625"D# 82)#C/5D,+8U+7BPE#3/7 O &6#7<2/+52"#78#7#:2"3B5:+#<&+A&&"#+A2#/5D,+8W#7#3&+%8N8#C5"7B5&"7<B&#/5D,+#+2# B53&E^{-35"}#:&/8%8#7#A2O7"N8#C/5D,+#+2#:,228&6E³⁵##

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)# J 7 "67BB#X7B 0 &/ : B75 0 8#+, 7+#+, &# - &: 2 "6#Q/&7+#9 A7P&"5"D)#5"#+, &#&7/B+#8&; &"+&&"+, #: &"+%/F)# C%++&/BF#/&8, 7. &6#/&B5D52 "#5"#9 0 &/5: 7E^{)&%}#7"6#+, 7+)#C7856/2 0 #+, &# 15; 5B#M7/E^{)&&}#5+#A78#C+, &# 0 28+# : 2 "8&` %& "+57B#&; &"+#5"#9 0 &/5: 7 "#, 58+2/F0E^{)&'#}H, 58#8&/5&8#23#I/2+&8+7 "+#/&;5; 7B8)#A, 5: , #+22P#.B7: &# 5 "#+, &#A7P#+, &# 9 0 &/5: 7 "# J &; 2B%+52 "#7:/288#+, &# h &A#O "DB7 "6)# 1 % 0 <&/B7 "6# p 7BB&F)#7 "6# % .8+7+&# h &A# e 2/P#/&D52 "8)#:/&7+&6#7#, %DA &/85+F#23#+, 2%D, +#7 0 2 "D8+#/&;5; 7B58+#+, 5" P&/86# S 7 "F# /&;5; 7B58+#&; 7 "D&B5: 7B8)#78#X7B 0 &/#&T.B75"8)#<&B5&; &6#+, 7+#+, &F#C<2/#/&8.2"85<5B5+F#32/#+, &# 50 ./2; & 0 & "+#23#82:5&+F)E#82#+, &F#.756#8. &:57B#7++&"+52 "#+2#+, &#C5"+&/&8+8#23#+, 28&# 0 28+# ;%B"&/7<B&)E^{)&(#}A5+, #07"F#32:%85"D#.78852"7+&#&332/+8#2"#82:57B#/&32/08#<&:7%8&#+, &F#A7"+&6#+2#

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J & ; &/& "6# g /G#X785B# S 7 "BF#- /G#A78#7#, %D&BF#5 "3B%& "+57B#7 "6#. /2 0 5 " & "+#82%+, &/ "#X7.+58+G# ! "#h 2 ; & 0 <&/# ' a)#=Z(()# S 7 "BF#7 "6#7#D/2%.#23#2+, &/#X7.+58+#B&76&/8#8& "+#7#B&++&/#+2#+, &# 0 7 "7D5 "D# <27/6#23#+, &#H/5& " "57B# 1 2 " ; & "+52 "G#H, &F#6& 0 7 "6&6#C+, ʒ+5" :+)#&T.B5:5+#7; 2A7B#+, 7+# 8B7 ; & , 2B6&/8#7/&#&B5D5<B&)#7 "6#& "+5+B&6)#& ` %7BBF#A5+, #"2"8B7 ; & , 2B6&/8#i j)#+2#7BB#+, &# . /5; 5B&D&8# 7 "6#5 0 0 % "5+5&8#23#+, &5/#8&; &/7B#% "52 "86E)^{''} 12"; &"+52"#b - X1c0⁽⁺#X&:7%8&#"2/+, &/"#&;7"D&B5:7B#7<2B5+52"58+8#+, /&7+&"&6#82%+, &/"# &;7"D&B5:7B8#A, 2#A7"+&6#+2#075"+75"#/7:57B#.%/5+F)#82%+, &/"#&;7"D&B5:7B8#6587335B57+&6#3/20#+, &# H/5&""57B#12"; &"+52"#7"6#32/0&6#+, &5/#D/2%. #%"6&/#+, &5/#2A"#7%+, 2/5+F0#93+&/#, &B.5"D#+2#:/&7+&# +, &#-X1)# S7"BF#

M, 5+R%+, &/ "#&; 7 "D&B5: 7B8#%8&6#B5+&/7B#5"+&/./&+7+52"8#23#+, &#<5<B&#+2#: 2"35/O#+, &# 8%./&07:F#23#A,5+&#.&2.B"6#L%8+53F#+,&5/#&332/+8#5"#8%<L%D7+5"D#93/5:7"#.&2.B&#+2#8B7;&/FG^{)((#} H,&#+A2#028+#23+&"#:5+&6#8:/5.+%/&8#<F#A,5+&#&;7"D&B5:7B#1,/58+57"8#5"#+,"+&<&BB%O#-2%+,#A&/&# Q&"&858#>W=ZU'?#7"6#9.,&857"8#\\aU?)+**#7B2"D#A5+,#+,&#+,+2/F#23#175"#7"6#9<&BG^{+*})#Q&"&858#>W=ZU '?#58#7#8+2/F#7<2%+#h27,#5"#A,5:,#h27,#:%/8&8#,58#82"#R70)#+,%+,&/#23#17"77"6#R70#8&&8#,58# 37+, &/#"7P&6#73+&/#h27,#37BB8#78B&&.#6/%"P)#7"6)#A, &"#h27,#A7P&8#%.#7"6#/&7B5_&8#+,58)#h27,# 8+7+&8)#C1%/8&6#<"77"K#7#8&/;7"+#23#8&/;7"+8#8,7BB#, &#<&#%"+2#,58#</&+,/&"G#9"6#,∴)# XB&88&6#<&#+、&#V2/6#Q26#23#-、&0K#7"6#17"77"#8,7BB#<&#,58#8&/;7"+6E^{+*+}#X%+B&/#7/D%&8#+,7+#C+,58# 8:/5.+%/&#<&:70&#+, %"67+52"#23#<5<B5:7B#L%8+535:7+52"#32/#8B7;&/FE^{+*,}#<&:7%8&#"5"&+&&"+,U :&"+%/F#C&T.285+2/8E^{+*#}#%"6&/8+226#17"77"#78#93/5:7#7"6#R70#78#<B7:P#.&2.B&G^{+*\$}#\$2"&8#7668#+,7+# A, 5+, /58+57"8#7B82#<&B5&; &6#<B7:P#. &2.B&#A&/&#+, &#C6&8:&"67"+8#23#175"GE+*%#M, 5+, /58+57"8# %"6&/8+226#67/P&/#8P5"#78#+,ͦ&#.,F85:7B#07/P#Q26#.%+#2"#175"#73+&/#175"#P5BB&6#9<&BG^{+*}&# S &7"5"D)#78#\$2"&8#"2+&8)#+, 7+#C5"#+, 58#"7//7+5; &)#+, /5D5"7B#<B7:P#7": &8+2/#A78#7#:/505"7BGE+**# \$2"&8#&T.B75"8#+,7+#+,58#%"6&/8+7"65"D#50.B5&6#+2#A,5+&#&;7"D&B5:7B#I/2+&8+7"+8#+,7+#<B7:P#.&2.B&# CB5P&BF#5", &/5+&6#"2+#2"BF#+, &5/#7": &8+2/N8#., F85:7B#658+5":+5; &"&88#<%+#7B82#, 58#5"3&/52/#02/7B# :,7/7:+&/GE^{+*}(#H,58#.7/+5:%B7/#%"6&/8+7"65"D#./&8&"+8#A,5+%./&O7:F#78#"2+#O&/&BF#7#.7885;&# .,&"20&"2"K#5+#7:+5;&BF#35"68#37%B+8#5"#7"6#6&02"5_&8#8B7;&86#X&:7%8&#A,5+R%+,&/"# &;7"D&B5:7B8#5"+&/./&+&6#8:/5.+%/&#B5+&/7BBF)#;&/8&8#5"#O.,&857"8#\\au?)#A,5:,#2.&"BF#/&3&/&":&# 8B7;&/F)#;7B567+&6#+,''8+5+%+52''#23#8B7;&/FG#X%+B&/#,5D,B5D,+8#+,7+#+,58#;&/8&#A78#%8&6#+2#8,2A#

^{!))}!]CD\$<*!N#0+, &86(13, %0"(%*!, 5k!

[&]quot;**!]Cl>\$<*!N#0+, &86(13, %0"(%*!, 5k!

[&]quot;*'!2#3\$:*!*N#0+, k: \$\$k4\$13**!, 5k!

^{***!}Y\$3\$:=:!440J!!j=3M!2(D\$:!n\$<:=#37k!]Ct>\$<*!N#0+, &86(13, %"(**!, 5k!)

[&]quot;*#!]Cl>\$<!!N#0+, &86(13, %)"(%!, 5%, Kk! "*!]Cl>\$<!N#0+, &86(13, %)"(%!, 5%, Kk! "*\$!]Cl>\$<!N#0+, &86(13, %)"(%!, 5%, Kk!

[&]quot;*%!]Cl>\$<*!N#0+, &86(13, %"(%*!, 5%, K&!

[&]quot;*&!2#3\$:*!N#0+, &: \$\$&4\$13

C+, 7+#8B7; &8#8, 2%B6#/& 075"#62:5B"6#2<&F#+, &5/# 078+&/8E⁺)*#<&:7%8+#A78#CQ26N8#A5BB#+, 7+#+, &F# A&/B7; &86E⁺)*#H, &8&#:, &//FU.5:P&6#<5<B5:7B#.7887D&8#D7; &#&;7"D&B5:7B8#+, % "67+52"7B# /&B5D52%8#&;56&":&#+2#L%8+53F#7#A, 5+%./&07:58+#56&2B2DF#A, 5:, #8%<8&`%&"+BF#5"3B%&":&6#, 2A# &;7"D&B5:7B8#% "6&/8+226#<2+, #+, & 08&B; &8#7"6#<B7:P#8B7; &86##

 $M, 5+&\#82\%+, &/''\#k; 7''D&B5:7B8\#85''D\#-5<B5:7B#8:/5.+\%/&\#+2\#8\%<8+7''+57+&\#+, &\#8\%./&O7:F\#23\# \\ A, 5+&\#.&2.B&\#7665+52'''7BBF#O2B6&6#+, &\#5''*B+5+%+\#8B7; &/F#5+8&B3G#H, &\#X5<B&#, 78#.7887D&8#+, 7+#<2+, # \\ 7::&.+#78#A&BB#78#:2''6&O''#8B7; &/F)^+)^+#<\%#A, 5+, /58+57''8#7:+5; &BF#658:2%''+&6#+, ''+508B7; &/F# \\ /,&+2/5:G#M, 5+&#&; 7''D&B5:7B#1, /58+57''#O58852''7/5&8#</2%D, +#C8B7; &#<5<B&8E#+2#+, /5<<&7''#A, 5:, # \\ &T:B\%6&6#7<2\%+#C>*#.&/:&''+#23#+, &# ! B6#H&8+7O&''+#7''6#7<2\%+#, 7B3#23#+, &#h &A#H&8+7O&''+6E^+)^+#$2''&8# \\ 7335/O 8#+, 7+#+, &&8&\#X5<B&8#&O., 785_&#C.7887D&8#6&O7''65''D#2<&65&'':&#+2#O78+&/8#7''6 k #&T:B%6&# \\ .7887D&&8#8\%DD&&8+5''D#&`'%7B5+F#2/#B5<&/7+52''GE+)^##XB7:P#8B7; &&8#5''#9O&/5:7#A&/&#./2, 5<5+&6#3/2O# \\ && (A765''D)#82#A, 5+ͷ &, 2B6&/8#A2%B6#</5''D#<B7:P#8B7; &&8#+2#:, %/:, #82#+, &F#A2%B6#< /:&6#+2# \\ ,&7/#+, && X5<B&N8#8:/5.+%/7B#L%8+535:7+52''#/7+52''7B5_5''D#+, &5/#88%<L%D7+52''G+''5#-2%+, &/''#&; 7''D&B5:7B8)# \\ \%'''G&/&8+7''G5''D#:2''UA, 5+&#.&2.BṩO.%/&#&; && *#+75''+&6)#3&B+#+, 7+#A, 5+&''&88#, 76#+2#<&#./2+&:+&6# \\ 7D75'''8+#/7:57B#:2''+7O5''7+52''G#d2/#&T7O.BB7; &&8#7''G#8B7; &, 2B6&/8#:2%B6#'''48, 70&## \\ 7D75'''8+#7':57B#:2''+7O5''7+52''G#d2/#&T7O.BB7; &&8#7''G#8B7; &, 2B6&/8#:2%B6#'''A#87O&## \\ 6/5'''P#6\%/5''D#:, \%/:, #82/+:, &%/*#, WO&## \\ 6/5'''P#6\%/5''D#:, \%/:, *#82/; &&86$

M, 5+, /58+57"8#/&: &5; &6#5"8+/%: +52"#5"#+, ŷ+, #3/20#A, 5+"58+&/8#A5+, #7#C67/P)# 7<565"D)#85D"5"D#93/5:7"#./&8&": &E#B5+&/7BBF#8&7+&6#<&,5"6#+, &5/#<7:P8#2/#7<2; &#+, &5/# ,&7680#M, 5B&#"2+#5"#A, 5+&#:2"D/&D7"+8N#35&B6#23#; 5852"#6%/5"D#+, &/; 5: &)#+, 58#B2205"D# ./&8&": , 7. &6#A, 7+#: 2%B6#<&#./7:+5: &6600#7"6#./&7:, &6 k #7"6#, 2A#A, 5+, /58+57"8# :70&#+2#&0<26F#7"6#%"6&/8+7"6#+, &5/#375+,)#D&"&/7+52"#73+&/#D&"&/7+52"6## H, &#&33&:+#23#+, &#&"8B7; &6#93/5:7"#90&/5:7"#./&8&": "#&7/BF#A, 5+Z&/5:7"#

1, /58+57"5+F)#7"6#+, &#A, 5+%. /& 07:58+#<&B5&38#+, 58#%", 2BF#7//7"D& 0&"+#:2"L%/&6)#A78)#23# :2%/8&)#"2+#6&35"&6#+2#+, W":+%7/FG#V5P#658+7"+#.B7"&+#A, 28&#./&8&"::#6&+&:+&6#<F# 5+8#&33&:+#2"#+, <L&:+8#7/2%"6#5+)#+, 58#%"7:P"2AB&6D&6#<B7:P#./&8&":&#&T&/+&6#7#8+/2"D# 82)#7"F#1,/58+57"#8B7;&,2B6&/#7<%85"D#8B7;&8#A78#7"#5"65;56%7B#./2<B&O#7"6#7#/&8%B+#23#+,7+# 8B7;&,2B6&/#058%"6&/8+7"65"D#,58#/2B&)#"2+#7#/&3B&:+52"#23#1,/58+57"5+F#5+8&B30#\$2"&8#8%007/5_&8# +,58#+,&2B2D5:7B#7../27:,#+2#8B7;&/FW##

&/&:+#+, &5/#8+7"6#5"#+, &# ./&8&":#+, &# .%B.5+)#7"6#+, &F#O%+%7BBF#, &B.#&7:, #2+, &/C#H, &# 6&7B&/#D5; &8#, 58#<B226U8+75"&6#D2B6#+2#8% ..2/+#+, &# .%B.5+)#7"6#+, &# .%B.5+)#5"#/&+%/")#:2; &/8# ,58#5"3&/"7B#<%85"&88#A5+, #+, &#D7/<#23#1, /58+57"5+FG#R&/&#A&#, 7; &#/&B5D52"#7"6#/2<<&/F#+, &# 7BB5&8#23#&7:, #2+, &/U6&; 5B8#6/&88&6#5"#+, "D&B8N#/2<&8)#7"6#, &BB#./&8&"+5"D#+, &O<B7":&# 23#.7/7658&6^{++&}##

g 2%DB788#6&8:/5<&6#1,/58+57"#8B7;&,2B6&/8#78#C+,&#A2/8+E^{++'}#7"6#37/#02/&#C:/%&B#7"6# :2A7/6BFE⁺⁺⁽#+,7"#2+,&/#8B7;&,2B6&/86#g2%DB788#%"6&/8+226#+,7+#1,/58+57"5+F#A78#"2+#+,&#C<&"5D"# 7"6#./2+&:+5;&E#32/:D75"8+#:/%&B+F#+,7+#&;7"D&B5:7B8#./&+&"6&6#5+#+2#<&6#1,/58+57"5+F#A78#+,&# 82%/:"6#0&/:,7"+#23#+,&#:/%&B+F6##

H, ʒ.7/5+F#<&+A&&"#A, 5+R%+, &/"#8B7; &, 2B65"D#1, /58+57"8N#/, &+2/5:#7"6#+, ::2%"+8# 3/2 0#8B7; &, 2A8#+, 7+#+, &#A2/P#A, 5+R%+, &/"#1, /58+57"#/&B5D52%8#B&76&/8#656#+2#<5<B5:7BBF# L%8+53F#7"6#B&D5+5 05_B7; &/F#<B5"6&6#82%+, &/"#&; 7"D&B5:7B8#+2#A, 5+%./& 07:FN8#3&8+&/5"D# A5+, 5"#+, &5/#/&B5D52"6#X&:7%8&#&; 7"D&B5:7B8#%"6&/8+226#8B7; &/F#78#.&/ 05885<B&#A5+, 5"#1, /58+57"5+F)# 7"6#1, /58+57"#:, %/:, &8#&; &"#&":2%/7D&6#8B7; &/F)#+, R:57B#8+7+%8#23#<&5"D#7#8B7; &, 2B6&/#A78# &B&; 7+&6#A5+, 5"#+, &#&; 7"D&B5:7B#1, /58+57"#:200%"5+F6⁺,*#9665+52"7BBF)#A, 5+R%+, &/"# &; 7"D&B5:7B8#<&B5&; &6#+, 7+#7#<B7:P#.&/82"#<&5"D#&"8B7; &6#<F#7#A, 5+, /58+57"#A78#5", &/&"+BF#

C"2#B2"D&/#, 2. /#L%8+5:&)#./2+&:+52")#2/#873&+FE#23#+, &5/#C.&:%B57/#./2.&/+FGE+#*#H,&#C.&:%B57/# ./2.&/+FE#0&7"+#8B7;&86##

S 7"BF#<&B5&; &6#+, 7+#8B7; &/F#A78#./2+&: +&6#<F#+, &# 1 2"8+5+%+52")+[#])#82)#<F#"2+#: 2"6& 0 "5"D# +, <2B5+52"#02; & 0 & "+)#+, "5+&6#-+7+&8#D2; &/" 0 & "+#A78#"2#B2"D&/#/&8.&:+5"D#+, &# 1 2"8+5+%+52"# A, 5: ,# 0 &7"+#+, 7+#9B7<707#X7.+58+8#A&/&#"2+#873&0#^3#+, &6&/7B#D2; &/" 0 & "+#, 76#/&<%P&6# 7<2B5+52"58+#56&78)#+, &#./2U8B7; &/F#.285+52"#A2%B6#, 7; &#<&& "#D5; & "#.2B5+5:7B#; 7B565+F#7BB2A5"D# &; 7"D&B5:7B8#+2#%., 2B6#A, 5+%./& 07:F# 0 2/&#&785BF0# S 7"BF#./2.285"D#+, 7+#9B7<707#8&.7/7+&# 3/2 0#+, "5+&6# = +7+&8#2.& "&6#+, &#.2885<5B5+F#32/#&; 7"D&B5:7B8#+2# 0 75"+75"#7#/7:57B#8&.7/7+52"# <&+A&& "#+, & 0 8&B; &"6#"2"UA, 5++, &/80#H, 58#5"8+5":+#+2#8&.7/7+&#:7BB8#<7:P#+2#+, /07+52"#23# +, &# - X 1 #7"6#+, 58#+, & 0 &#A2%B6#:2"+5"%&#+2#5"3B%&":&#&; 7"D&B5:7B#<&, 7; 52/#5"+2#+, &#+A&"+5&+, # :& "+%/F0##

d/7 0 5"D#&; 7"D&B5 : 7B8N#% . 8&+#78#7#/&8%B+#23#+, &# 4 "5+&6# - +7+&8#D2 ; &/" 0 & "+N8#% "L%8+#7 : +52"8)# S 7"BF)#/& 0 7/P7<BF)#A78#7<B&#+2#: , 7"D&#+, &#/22+#23#&; 7"D&B5 : 7B# : 2" : &/ "#+2#7# . 7+/52+5 : #6&3& "8# B5<&/+F#5"8+&76#23#7#6&3& "8#/7 : 57B# . /&L%65 : &0#H , 2%D , # S 7"BF#7"6#2+, &/#&; 7"D&B5 : 7B8#656#"2+# &T .B5 : 5+BF#6& "F#+, &5/#/7 : 57B# . /&L%65 : &)#<F#3/7 0 5"D#+, /5D5"#23#&; 7"D&B5 : 7B8N#% "/&8+#78#7#/&8%B+#23# + , &# 4 "5+&6# - +7+&8#D2 ; &/" 0 & "+#; 52B7+5"D#7#/5D , +)# S 7"BF#</276& "&6#+, &# . 2+& "+57B#67"D&/#+2#"2"U &; 7"D&B5 : 7B8#78#A&BB#78#&; 7"D&B5 : 7B8#7"6# . /&35D%/&6#+, &#/5D , +8#B7"D%7D&#%&&6#<F#&; 7"D&B5 : 7B8#7"6# J &7D7"#5"#+, &#+A&"+5&+, #: & "+%/F0#H , &#+, /&7+& "&6#/5D , +8#5" : B%6&6#+, &5/# : 2"8+5+%+52"7B#/5D , +#+2#2A "# + , &5/#C . & : %B57/# . /2 . &/+F)E#<%+#7B82#+, &5/#7<5B5+F#+2#3/&&BF# . /7 : +5 : &#+, &5/#/&B5D52%8#<&B5&38)#82# S 7"BF# %/D&6#9B7<7 0 7#+2# . /2+& : +#5+&&B3#7"6#&& . 7/7+&6#9665+52"7BBF)# S 7"BF#6&.5 : +&6#&; 7"D&B5 : 7B8#7"6#7BB# 23#+, &# - 2%+, #78#; 5 : +5 0 8#23#7#+F/7"5:7B)#7%+, 2/5+7/57"#D2; &/" 0 & "+#A, 5 : ,#58#7"2+, &/#+, & 0 &# J &7D7"# %8&66# S 7"BF#5 0 .B5&6#+, 7+#<& : 7%B&#+, "5+&6#+ -+7+&8#A78#"2+#&":2%/7D5"D#A, 5+% . /& 0 7:F)#5+#A78# 5.82#37:+2#&"67"D&/5"D#82%+, &/"&/8N#:2"8+5+%+52"7B#/5D, +86#XF#625"D#82)# S 7"BF#&8+7<B58, &6#+, 7+#+, &# 4 "5+&6# - +7+&8#3&6&/7B#D2; &/" O &" +#A78#7+#37%B+)#7"6#9B7<707#&; 7"D&B5:7B8)#78#A&BB#78#+, &5/#<&B5&38)# A&/""2:&" +#7"6#.&/8&:%+&66##

S 7 "BF#A78#&B&: +&6#+2#8&: , N#: , 7. B75"#+2#+, 	 B7<7 0 7#- &: &88852"# 1 2" ; &"+52")#7 "6)#A, &"# 9B7<7 0 7#; 2+&6#+2#8&: &6/2 0#+, "5+&6#-+7+&8)#, &#, &B. &6#6/73+#9 B7<7 0 7N8#8+7+&#: 2"8+5+%+52" 0# S 7"BF#A78#A56&BF#P" 2A"#7:/288#+, &# 1 2" 3&6&/7+&#-+7+&8)#7" 6#, &#D7; &#+, . &"5" D#./7F&/#7+#+, &# I/2; 5852"7B# 1 2" D/&88#23#+, &# 1 2" 3&6&/7+&#-+7+&80# g %/5" D#+, 58# 1 2" D/&88)#5" #7665+52" #+2#+7P5" D#:/&65+# 32/#+, &# 1 2" 3&6&/7+&# 1 2" 8+5+%+52")# S 7" BF#5"; 2P&6#C+, % 2/#23#+, 	 B 0 5D, +FE+#+#7" 6#78P&6#Q26# +2#./2+&: +#+, &# 1 2" 3&6&/7: F#82#+, 7+#5+#A2%B6#B78+#C78#B2" D#78#+, % "#7" 6#+, &# 0 22" (E+#+# S 7" BF#D7; &# +, " 7%D%/7B#766/&88#7+#\$&33&/82" # g 7; 58N# 1 2" 3&6&/7+&#./&8856&"+57B#5" 6%: +52" #7" 6#" 2+7<BF#/26&# A5+, # g 7; 58#7" 6#+, &# p 5: &# I/&856&" +#+2#+, ˾/&886+### S 7" BF#<&: 7 0 &#+, ट: 57B#:, 7. B75" #+2#+, &# 1 2" 3&6&/7: F#7" 6#/& 0 75" &6#:, 7. B75" #+, /2%D, 2%+#+, &# 15; 5B#M7/6#\$2" &V&8: /5<&8#, 50 d78#C7# 8+&76378+#7" 6#& 2%D, +U73+&/#/&B5D52%8#; 25: &#L%8+53F5" D#8B7; &/F#7" 6#A, 5+%./& 0 7: F%E+#5 S 7" BFN8# 5" 3B%&": " #+, &# 1 2" 3&6&/7: F#: 7" "2+#< &: &/8+7+&6K#& ; &/F#8+&.#23#+, &#A7F)#, &#A78#+, &/&#A78#+, &/&#, /2; 565" D# 65; 5" &&L%8+535: 7+52" #32/#&; &//F+, 5" D#32/#A, 5:, #+, &# 1 2" 3&6&/7: F#8+226#3%/+, &/#&C7# &; 7" D&B5: 7B5 0 #7" 6#A, 5+&28%, /& 0 7: F#5"#+, &# 12" 3&6&/7: F#8+& .#23#+, &#A7F)#, &#A78#+, &/&#, /2; 565" D# 65; 5" &&L%8+535: 7+52" #32/#&; &//F+, 5" D#32/#A, 5:, #+, &# 12" 3&6&/7: F#8+226#3%/+, &/#&C7# DB5" D# &; 7" D&B5: 7B58 0 #7" 6#A, 5+&28%, /& 0 7: F#5"#+, &# 12" 3&6&/7: F#8+& .#23#+, &#A7F)#, &#A78#+, &/&&#, /2; 565" D# 65; 5" &&L%8+535: 7+52" #32/#&; &//F+, 5" D#32/#A, 5:, #+, &# 12" 3&6&/7: F#8+226#3%/+, &/#&C7# DB5" D# &; 7" D&B5: 7B58 0 #7" 6#A, 5+&28%, /& 0 7: F#5"#+, &# 12" 3&6&/7: F#8+226#3%/+, &/#&C7# DB5" D# &; 7" D&B5: 7B58 0 #7" 6#A, 5+&28%, /& 0 7: F#5"#+, &# 12" 3&6&/7: F#8+226#3%/+, &/#&C7# DB5" D# &; 7" D&B5: 7B58 0 #7" 6#A, 5+&28%, /& 0 7:

9 B+, 2%D, # S 7"BFN8#C8% : : &88#7"6#5"3B%&" : &#A&/&#. &/, 7.8#%"07+:, &6)E^{+#%}#\$2"&8#&T.B75"8# +, 7+#C+, &#</276#5"3B%&" : &#, &#, 76#78#7#/&B5D52%8#B&76&/#A78#"2+#%"5`%&GE^{+#&}#O; 7"D&B5:7B#B&76&/8#, 76# D/&7+#8A7F#2; &/#+, &5/#6&"205"7+52"8)#7"6#07"F#%8&6#+, 7+#5"3B%&" : &#+2#&8.2%8&#+, "3&6&/7:FG# d2/#&T70.B&)#+, &# - X1)#5"#5+8#5"5+57B#C966/&88#+2#+, &#I%<B5:)E#:B750&6#+, 7+#5+8#2""6#2"BF#

"\$&!2#3\$:*!*N#*0+, *k*: \$\$*k*4\$13*!6K*k*!

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./& O 5BB&" "57B58+#A2/B6#58#35BB&6#A5+, #67 "D&/2%8#&; 5B8)#7 "F#5"L%8+5: % "6#2"#O7/+, #A78#"2/O 7B# 7"6#"2+#7#C:7BB#32/#7:+52"E+%;#2/#&;7"D&B5:7B8N#/&8.2"85<5B5+F#+2#35T6#H, 58#+, &2B2D5:7B#/&2/5&"+7+52"# A2%B6#,7;UD"535:7"+#.2B5+5:7B#5 O .B5:7+52"8#5"#+, &#.28+U 1 5; 5B#M7/#.&/526)#7"6#5+#A2%B6# &;&"+%7BBF#./2;56&/+5B̹B#32/#+, &5/#.2B5+5:7B#/&7A7P&"5"D#5"#+, &#=>Z*86##

I/& O 5BB&" "57B58 O #7<82B; &8#&; 7 "D&B5: 7B8#23#7 "F#/&8. 2 "85<5B5+5&8#+, &F# O 7F#, 7; &#+2#+, &# </276&/#: 2 O O % "5+FG#^3#87B; 7+52 "#6&. & "68#2 "#+, " 65; 56% 7B#7B2 "&)#+, "BF#7: +52 "8#7 "#5" 65; 56% 7B# , 78#+2#62#32/#+, &#: 2 O O % "5+F#7/: +52 "8#+, 7+#<& "&35+#+, " 65; 56% 7BG#H, 58#A78#7 "#5 O . 2/+7" +#37: +2/# 5"#&; 7 "D&B5: 7B8#<&: 2 O 5" D#B&88#5" :B5" &6#+2#: 7/<2%+#82: 57B#588%&8#2/#/&32/ O 8#<&: 7%8&)#78#\$2" &8# &T . B75" 8)#+, &F#8, 53+&6#+, &5/#C7++& "+52 "#3/2 O #+, &#: 2BB&: +5; BB8#23#82: 5&+F#+2#+, WB; 7+52 "#23# 5" 65; 56% 7B86E+%##O; 7" D&B5: 7B8#<&D7" #+2#<&B5&; &#+, 7+#2" &# O %8+#./2+&: +#2" &N8#2A "#8&B3#3/2 O #&; 5B#7" 6# X&: 7%8&#CA, 5+&#&; 7"D&B5: 7B8N#: %B+%/7B#+22B#P5+#: 2"858+8#23#+22B8#+, 7+#/&8+/5: i+j#+, &5/# O 2/7B#; 5852"#+2# +, &# . &/82"#7"6#5"+&/ . &/82"7B#/&7B O 8 k #i+, &F#8:/&&"j#2%+#5"8+5+%+52"7B#2/#8+/%: +%/7B#588%&8)E^{+%}(# O &7"5"D#&; 7"D&B5: 7B8#</276BF#<&B5&; &#+, 7+#<B7 O &#/&8+8#82B&BF#2"#7"#5"65; 56%7B#32/#7"F#588%"&# O 7F#<%:5"D#5"#2"&N8#2A"#B53&G# I/& O 5BB&""57B58 O #3/7 O &8#+, "65; 56%7B#]#A, 7+#2">&8)#87F8)# 7"6#<&B5&; &8#]#78#+, &#:/%T#23# O 2/7B#: 2"8&`%&": &G# 9 3+&/#+, &# 15; 5B#M7/)#A, 5+R%+, &/"# 3&7+%/#./2.&/#82%+,&/"#:%B+%/&G#H,&:2"6#<22P#8,53+&6#6/707+5:7BBF#7"6#7/D%&6#+,7+#+,&# 12"3&6&/7++7+&8#,76#/&<&BB&6#+2#./2+&:+#8+7+R&/&5D"+FG^{+&)}#R58#8&:2"6#<22P#:7BB&6#32/#7#CA7/# 23#56&78E^{+&+}#+2#./&8&/;R%+,&/"#:%B+%/"6#5"8.5/&6#7#02;&0&"+#7"6#:5;5B#/&B5D52"#+,7+#,78#<&&"# A56&BF#/&:2D"5_&6#<F#8:,2B7/8#78#+,&#CJ&B5D52"#23#+,&#V28+#17%8&GE^{+&,#}H,&#J&B5D52"#23#+,&#V28+# 17%8�&/D&6#1,/58+57"#+,&2B2DF#A5+,#90&/5:7"#,58+2/F#A,5:,#:/&7+&6#+,&#:5;5B#/&B5D52"#23#+,&# V28+#17%8&G## $82\%+, \&/"\&/8\#+/5\&6\#+2\#2; \&/: 20\&\#+, \&5/\#\&T58+\&"+57B\#A2//5\&8\#7"6\#+2\#B5; \&\#A5+, \#+, \&5/\#+/7D5: \#8\&"8\&\#23\#B53\&G^{+\&\%}\#\#\#$

:2"8&/;7+5;&#;7B%&8#7"6#6&.5:+#+,28&#;7B%&8#78#+,"&8#"&&65"D#./2+&:+52"#3/20#2../&8852"G#H,&#

;&/<7BBF#: 2" "&:+5" D#8+2/5&8)#5 O 7D&8)#7" 6#+, & O &"#+, <B&#+2# 1 5; 5B#M7/#8+2/5&8#7" 6#35D%/&80#H, &# <5<B5: 7B#+, & O #/& "&A7B#7" 6#/&<5/+, #A78#&8. &: 57BBF#; 5+7B#5" #<2B8+&/5" D#+, 8&7#+, 7+#+, &# - 2%+, # A2%B6#2 "CF#<&#; & "&/7+&60# 1 2 "3&6&/7+RB65&/8#7" 6#D& "&/7B8#A, 2#65&6#5" #+, &# 1 5; 5B#M7/# <&: 7 O &# O 7/+F/8)#7" 6#+, &# . &2 . B#+, &# - 2%+, #<&: 7 O &#+, &# . &2 . B#^8/7&B0+(*#M, 5+&#&; 7" D&B5: 7B# /&B5D52%8#B&76&/8#&; & "#B5" P&6#+, &# . B5D, +#23#+, &# - 2%+, #+2#\$&8%8N#6&7+, #7" 6#/&8%//&:+52" #+2#8, 2A#+, 7+# 5"L%8+5:"F#82%+,&/"&/8#3&B+#7<2%+#+,%+:20#+,5B#M7/#A,5Bᷱ+52"7BBF#8,2A5"D# 2"#+,&#:2/&#<&B5&38#23#+,&#J&B5D52"#23#+,&#V28+#17%8&W#+,&#-2%+,#:7"#7"6#A5BB#/&+%/"#+2#DB2/FG# H,&#-+6#I7%BN8#0.58:2.7B#1,%/:,#5"#J5:,02"6#02/&#&T.B5:5+BF#6&.5:+8#+,&8&#+,&0&8#7"6#.7/7BB&B8W# 5"#+,58#:,%/:,)#J2<&/+#OG#V&:#8,2A"#5"#8+75"&6#DB788#78#<2+,#7#F2%"D#S28&8#+%/"5"D#7A7F#3/20# I,7/72,#7"6#7"#2B6#S28&8#P"&&B5"D#A5+,#7#,7B2#2;&/#,58#,&766#g&8.5+&#+,&#C05"6U<&"65"D#5/2"F)E# \$2"&8#&T.B75"8#+,7+W#

H,"7B2DF#58#:B&7/W#L%8+#78#S28&8#/&3%8&6#8&/;5:&#+2#I,7/72,#5"#2/6&/#+2#B&76#,58#.&2.B&#

A&/&# . %+#% . #73+&/#+ , &#& "6#23#+ , 5B#M7/)#7 "6#+ , &8"% 0& "+8#&88& "+57BBF#8&/; &6#78#, 2BF#85+&8# 32/#+ , &# J &B5D52 "#23#+ , &#V28+#17%8&G+((#M, 5+R%+ , &/ "#&;7 "D&B5:7B8#5"#+ , &#A7P#+ , 5B#M7/# 87:/7B5_&6#+ , &5/# , 58+2/FK#+ , &F#&07":5.7+&6#<2+ , #+ , &08&B; &8#7 "6#+ , &5/#35D , +#3/20#65;5" "6#&7/+ , BF# :2"6&0 "7+52 "6##

X%+#A, 5+R%+, &/ "#&; 7 "D&B5: 7B8#, 76#7#B7/D&/#D27B#+, 7 "#L%8+#5" 3B%&":5 "D#+, &5/#2A"# :200% "5+FK#+, &F#A7"+&6#+2#6&3& "6#<2+, #+, " 3&6&/7: F#7" 6#+, & 08&B; & 8#C "7+52" 7BBF6E^{,**}#H, &# J&B5D52 "#23#+, &#V28+#17%8&#D7; &#A, 5+R%+, &/ "#&; 7 "D&B5: 7B#1, /58+57" 8#7#A7F#+2#5" 3%8&#A, 5+&# 8%./&07: F#5"+2#+, &#/&8+#23#90&/5: 7 "#:%B+%/&G#h2/+, &/ "#A, 5+&#&; 7 "D&B5: 7B#7<2B5+52" 58+8#07F#, 7; &# 2..28&6#:, 7++&B#8B7; &/F)#<%+#07" F#A&/&#"2+#2..28&6#+2# /7:57BBF#./&L%65:57B#5"8+5+%+52"8#73+&/#+,5B#M7/#<F#&8+7<B58,5"D#+,&#V28+#17%88&2B2DF#78# B&D5+5 0 7+&)#7"6#78#7#/&8%B+)#+,&F#A&/B82#7<B&#+2#&8+7<B58,#+,&08&B;&8#78#/5D,+&2%8#;5:+5086#

O;&"#+, 2%D, #A, 5+&#&; 7"D&B5:7B#1, /58+57"8#O7F#, 7;&B+#+, 7+#+, &F#7"6#+, &5/#:%B+%/&#A&/&# .&/8&:%+&6#;5:+5O8)#+, &/:#7#O7:7<//2"F#5"#, 2A#&;7"D&B5:7B8#7:+5;&BF#.7/+22P#5"#&T+/&O&BF# </%+7B#7:+8#23#;52B&":D75"8+#<B7:P#9O&/5:7"86#g%/5"D#J&:2"8+/%:+52")#CBF":,5"D#<&:7O&#+,&# %B+5O7+&#O%/6&/2%8#+22B#%8&6#+2#8%..2/+#A,5+%./&O7:FE^{*},#5"#+,&#-2%+,)#

:,%/:,&86^{,)#}#I/2D/&885;R%+,&/"#&;7"D&B5:7B#/&B5D52%8#B&76&/8)#B5P&#V&8B5&#QA7B+"&F)#6&3&"6&6# 7"6#./758&6#+,^{,)\$}#!".+58+#.78+2/#L%8+535&6#L25"5"D#+,�#<F#:B7505"D#+,7+#&;&/F# /&B5D52%8#.&/82"#C23#50.2/+7"::#7#0B7"#0&0<&/GE^{,)%}#9505"D#+2#./&8&/;&#A,5+&#/7:57B#.%/5+F)# H,�#A7D&6#:/%876&8#7D75"8+#+,28&#A,2#A&/&#"2+#82%+,&/")#A,5+&)#7"6#I/2+&8+7"+6#H,58# 07P&8# $93 + \&/\#M2/B6\#M7/\#^{n}) \#78\#8\% < \%/<7"\#"\&5D, <2/, 2268\#D/\&A\#5"\#.2.\%B7/5+F) \#820\&\#"2"$

A,5:,#\$2"&8#&T.B75"8#58#7#C/&3&/&":&#+2#+,&#.2B5+5:7B#O7:,5"&#+,7+#5"37O2%8BF#:2"+/2BB&6#h&A# e2/P#.2B5+5:8#5"#+,&#B7+&#"5"&+&&"+,#:&"+%/FGE^{,+%}#S%B+5.B&#D&"&/7+52"8#23#R&6&/O7"8#8&/;&6#78# 6&7:2"8#23#+,&#:,%/:,K#+,&F#A&/&#D&"&/2%8#35"7":57B#62"2/8K#7"6#+,&F#A&/":/&65<BF#5"3B%&"+57B# 5"#8,7.5"D#+,&#dX1N8#8+7":"#/7:57B#588%&86^{,+&}#H,58#58)#5"#.7/+)#<&:7%8&#+,&#R&6&/O7"#37O5BF#/7"# 8%/./585"DBF#8%..2/+&6#+,&:5852"#5"#+,&#-%./&O%/+#:78&#

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/7652#8+7+52"8#%8%7BBF#/&7:,&6#B2:7B)#./507/5BF#A,5+&)#B58+&"&/86^{,,(}#^"#=>?@)#+,58#:,7"D&6#A,&"# X2<#\$2"&8#4"5;&/85+F#7B%0#-+%7/+#O..&/82"#7"6#</2+,&/U5"UB7A#O6A7/6#9+85"D&/#32%"6&6#7"#d S # /7652#8+7+52"6#^"# #

A, 5:, #2%+B5"&8#+, &#, 58+2/F#23#1, /58+57"#0&657#7"6#+, &#. 2A&/#23#5+8#5"3B%&": &)#9""&#h&B82"# &T.B75"8#+, 7+#O..&/82"#7"6#9+85"D&/#<%5B+#7#; 78+#"&+A2/P#23#/7652#:, 7""&B8#7:/288#90&/5:7#+, 7+# ./&7:, &6#:2"8&/; 7+5; R:57B#; 7B%&8#+2#5+8#&; 7"D&B5:7B#B58+&"&/86#M, 5B"F#&; 7"D&B5:7B8#07F# "2+#, 7; &#<&& "#65/&:+BF#5"; 2B; &6#5"#. 2B5+5:8#73+&/#+, &#C -: 2.&8# S 2"P&FE#+/57B)#+, /2%D, #8%:, #0&657# 2%+B&+8#78#/7652#7"6#"&A8.7.&/8)#+, &5/#A, 5+%./&07:58+#; 7B%&8#3B2%/58, &6#5"+&/"7BBF)#7"6# +, /2%D, 2%+#+, &#F&7/8#32B2A5"D#)#. &/0&7+&6#+, &#</276&/#.2B5+5:7B#A2/B6#7"6#90&/5:7"# :%B+%/&6##

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A&BB#78#+, &#V28+#17%8&N8#56&2B2DFG#R&#:7BB&6#2"#8+7+&8#+2#/&:B750#+, &5/#CB28+ k .2A&/E^{-,\$,}#7"6#2"# +, &6&/7B#D2;&/"0&"+#+2#CA5+,6/7A#./20.+BF#7"6#+2+7BBF#3/20#&;&/F#L%/5865:+52"#A,5:,#+,&# 12"8+5+%+52"#/&8&/;&8#+2#+,+7+&86E^{,\$#}#H,58#/&82"7+&6#A5+,#A,5+R%+,&/"&/8#A,2#2..28&6#

#Q2B6A7+&/N8#/,&+2/5:#8+/2"DBF#&:,2&6#+,7+#23#+,"3&6&/7:FN8#78#

7"6#2+, &/#3&6&/7B#D2; &/" 0 &" +#./2D/7 0 8)#B5P&#A&B37/"6# S &65:7/&)#+, 7+#756&6#8+/56&8# +2A7/68#/7:57B#&`%7B5+FG#Q2B6A7+&/N8#=>\(#./&856&"+57B#:70.75D"#<&7/8#7#8+/5P5"D#/&8&0<B7":&#+2# +, &#B7+&/#:70.75D"8#23#<2+, #h5T2"#7"6# J &7D7"\#Q2B6A7+&/#+7BP&6#7<2%+#9 0 &/5:7N8# 0 2/7B#6&:7F)#

/52+8#23#C, 2//53F5"D#./2.2/+52"E^{.&.}#</2P%+#5"#+, ,5:7D2#7/&7#7"6#/&8%B+&6#5"#\$G#O6D7/#R22; &/# .B7:5"D#<B7:P#7:+5;58+8#%"6&/#D2; &/" 0 &"+#8%/; &5BB7": &G^{.&#}#H, &#/52+8#8+7/+&6#73+&/#7#F2%"D#<B7:P# 07"#6/2A"&6#5"#V7P&# S 5:,5D7"#73+&/#, &#,76#A7"6&/&6#5"+2#+, &#A,5+&:+52"#23#7#8A50 05"D#7/&7# 7"6#A78#.&B+&6#A5+,#/2:P86^{.&\$}#H, &#F2%"D#07"N8#6&7+,#./20.+&6#820&#A,5+Z&/5:7"8#7:/288# +,&#:2%"+/F#+2#&"D7D"#</%+7B#7:+8#23#;52B&":D75"8+#<B7:P#90&/5:7"86#M,&"#<B7:P#90&/5:7"8# C32%D,+#<7:P)E^{.&%}#R22;&/)#7"6#2+,&/#A,5+Z&/5:7"8)#:70&#+2#8&&#+,58#/&858+7":N#&;56&":&# +,7+#<B7:P#90&/5:7"#7:+5;58+8#7"6#D&"&/7B#82:57B#02;&0&"+8#A&/C"D&/2%86^{.&&#}M,5B&#+,&8&# 56&78#8+7/+&6#5"#+,&#&7/BF#+A&"+5&+,#:&"+%/F)#X%+B&/#&T.B75"8#+,7+#+,&F#:2"+5"%&6#+2#8+5D07+5_&# <B7:P#90&/5:7"8#7"6#:7BB#32/#&`%7B5+F#5"#+, BB2A5"D#6&:76&88###

XB7: P#9 0 &/5: 7" 8N#7: +5; 58 0 #6%/5" D#+, &#C J &6# - % 0 0 &/E#+5" D&6)#5"#+, &#&F&8#23#A, 5+R%+, &/'# &; 7" D&B5: 7B8)#+, : +5; 58 0 #7" 6#82: 57B# 0 2; & 0 & "+8#23#+, &#B7+&/#+A&"+5&+, #: & "+%/F#A5+, #7#/7: 57B#, %&6# H, &#% "6&/BF5" D#: 2" "&: +52" #+2#/7: &#+, & "#&785BF#7BB2A&6#&; 7" D&B5: 7B#/&B5D52%8#B&76&/8#+2#3/7 0 &# 6&8&D/&D7+52"#7" 6#: 2 0 0 % "58 0 #78#7" +5UQ26# 0 2; & 0 & "+8#% "6&/#+, W 0 &#% 0 </&BB76#d2/#&T7 0 .B&)# S 5885885...5# 1 2BB&D&#A78#7#35/ 0 #8&D/&D7+52" 58+#X7.+58+#5" 8+5+%+52" #B2: 7+&6#5" # 1 B5" +2" #L%8+#7#3&A# 0 5B&8#7A7F#3/2 0 #\$7: P82" 6#^+8#./&856&" +)# g 6 S 6# h &B82")#: B75 0 &6#+, 7+#5" +&D/7+52" #A78#<78&6#2" # C 0 7/B# S 7/TN8#62: +/5" #5" +&/"7+52" 7B58 0)E · & (#7" 6#+, 7+#5" +&D/7+52" #7" 6#: 2 0 0 % "58 0 #, 7; &#+, &# 87 0 &#& "6#D27B##C+, <85+&/7+52" #23#7BB#"7+52" 7B#7" 6#/7: 57B#658+5" :+52" 8#7" 6#+, #" 7B#7 0 7BD7 0 7+52" #

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#`\$!]CD\$<*!N#0+,&86(13,%0"(%*!+-&!</pre>

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^{#*})¹2#?3!P=#D\$<*!4\$"(%45,\$=%,.4:#, k!+);33%,&\$k\$(4060%203#:-1071k70--0-0==011.<Q(3(!LCk(k0k!.3=%k!#F!!)>>=3#::!6<\$::*!,44J7k!pC#k\$)!F<#D!T(<%\$I*

+, &#<&8+#<%+#7:+%7BBF#+, "BF#82%/: #D226# 0 2/7B#; 7B%&86#R B82#5 0 . B5&6#+, 7+#9 0 &/5:7" 8#A, 2# 62"N+#<&B5&; "#Q26#62"N+#+/%BF#:7/<2%+#9 0 &/5:76#R &#& 0 . ,785_&6#+, 7+#9 0 &/5:7#:7"#2"BF#<# /5D, +&2%8#"7+52"#A, &"#9 0 &/5:7" 8#+%/"#+2#&; 7"D&B5:7B58 0 G#X5BBF#Q/7, 7 0 N8#/, &+2/5:)#<%5B+#2"# /7:58 0)# . /&8& "+&6#&; 7"D&B5:7B8#78#+, &# 0 2/7B#87; 52/8#23#9 0 &/5:7)#35D, +5"D#7D75"8+#&; 5B0#H, 58#B5" # +, 5"P5"D#A2%B6#:2"+5"%&#+2#D/2A#5"#&; 7"D&B5:7B#:%B+%/"6#X5BBF#Q/7, 7 0 #6& 0 2"8+/7+&6#, 2A#7# 35D%/&#:7"#%8&#/, &+2/5:#<2+, #+2#, &B.#&; 7"D&B5:7B8#5"#7"6#+2#&T2"&/7+&#+, & 0 #32/#/&&"+&/5"D#+, A/+F# 7"6#5 0 0 2/7B#A2/B6#23#. 2B5+5:86###

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 #A78#+, #/8+# - %. /& 0 &# 1 2%/+#: 78&#+2#+/2%<B&#&; 7 "D&B5: 7B8N#</td>

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 A&/&# . &/: &5; &6#78#+, &#D/&7+&/#:, 7BB&"D&#+2#+, &5/#.%/&#A, 5+&#:200%"5+F)#<%+#+, &F#32%"6#7#82B%+52"W#</td>

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G#H,#"7B#<B2A#+2#&;7"D&B5:7B8N#/7:57B#<2%"67/F#:7O&#A,&"#+,&#^J - #/&;2P&6#+,+7+%8# 23#8&;&/7B#&;7"D&B5:7B#8:,22B8G#R&/&)#A,5+R%+,&/"#&;7"D&B5:7B#1,/58+57"8#,5+#+,&5/#</&7P5"D# .25"+G#H,&F#3&B+#+,7+#+,&#D2;&/"O&"+#A78#+7/D&+5"D#+,&O#7"6#+,&5/#:%B+%/&G#H,&#;7/52%8#:2%/+# 8+&.#5"+2#+,8U=>?*8#.2B5+5:7B#/&7B0G#9BB#+,&F#"&&6&6#A78#7#.2B5+5:57"#+2#8%..2/+6#H,&F#A&/&# B22P5"D#32/#7#.2B5+5:57"#A,2#A2%B6#"2+#058+/&7+#+,&0)#A,2#A2%B6#"2+#8,70&#+,&0)#7"6#A,2# A2%B6#6&3&"6#+,&0)#7"6#J&7D7"#8,2A&6#&;7"D&B5:7B8#+,7+#,�&+#+,&5/#:/5+&/576##

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4 "6&/8+7 "65" D#+, &#, 58+2/5:7B#:2" "&:+52 "#<&+A&& "#A, 5+%./& 07:F#7 "6#&;7" D&B5:7B58 O # , &B . 8#+2#5BB% O 5''7+&#+, &#: /%: 57B#/2B&#/7: 57B#. /&L%65: &#. B7F&6#5''#&; 7''D&B5: 7B8N#. 2B5+5: 7B#5''; 2B; & O & ''+# +,/2%D,2%+#&;7"D&B5:7B8N#,58+2/F#5"#90&/5:7)#:%B05"7+5"D#5"#+,&5/#6/707+5:#/&&"+/F#5"+2#46-G# . 2B5+5: 7B#B53''#+, &# J & 7D7''#&/76#-. &: 535: 7BBF)#A, 5+R%+, &/''#&; 7''D&B5: 7B#1, /58+57''5+F#7''6#A, 5+&# 8%./&07:F#.7:&#D/2A"#7B2"D856"6#8&&.&6#5"+2#2""2+.&/0#H.58#.78#.76#B78+5"D#50.B5:7+52"8# 5"+2#+, &#+A&"+FU35/8+#:&"+%/F0#^"#7665+52"#+2#A7BP5"D#+, /2%D, #+, &#%"&T.B2/&6#, 58+2/F#23#+, &# 62 0 5"7"+#/2B&#+, 7+#A, 5+, /58+57"8#, 7; &#. B7F&6#5"#075"+75"5"D#A, 5+%. /& 07:F#5"#9 0&/5:7)# J2<&/+#IG#\$2"&8N# 7B82#8,2A8#,2A#+,58#,58+2/F#50.7:+8#A,5+,/58+57"# 90&/5:7"8N#:2"+&0.2/7/F#+,2%D,+8#2"#/7:"6#/7:580G^{,'#}#R&#%+5B5 &8#+A2#8+%65&8#+2#6&02"8+/7+&# +,58\\\#2''&#<F#+,z.&/7+5;''D/&8852''7B#OB&:+52''#-+%6F#b110-c#7''6#+,+,&/#<F#+,%<B5:# J & B5D52"# J & 8&7/: ,#^''8+5+%+&#b I J J ^c6#H , 1 O - #32% ''6#+ ,7+#82%+ ,&/''#A ,5+&# . &2 . B&#B5 ;5''D#5''#7/&78# A5+, #, 58+2/5:7BBF#, 5D, #B&; &B8#23#8B7; &/F#, 76#85D"535:7"+BF#6533&/&"+#7++5+%6&8#:20.7/&6#+2#A, 5+&# . &2 . B&#B5;5"D#5"#7/&78#A5+, #,58+2/5:7BBF#B2A&/#B&;&B8#23#8B7;&/FG#M,5+&#.&2 . B"#7/&78#A5+, #,5D,&/# ,58+2/5:7B#B&;&B#23#8B7;&/F#A&//&#.2B5+5:7BBF#:2"8&/;7+5;"6#B&7"&6#J&.%<B5:7")#8,2A&6# ,5D,&/#B&;&B#/7:57B#/&8&"+O&"+)#7"6#A&/&#O2/&#B5P&BF#+2#2..28Ყ/O7+5;:+52"6#\$2"&8# +,&2/5 &8#+,7+#+,58#O&7''8#C+,&&.#/7:57B#./&L%65:&#+,7+#A78#:/&7+&6#<F#7#8B7:&,2B65''D#82:5&+F#58# E^{, '\$}#R&#:2'':B%6&8#+,7+#/7:580#7''6#+,&#&332/+8#23#82%+,&/''#1,/58+57''# :2//&B7+52"7B#<%+# 9 0 &/5:7"8#+2# 0 75"+75"#A, 5+%./& 0 7:F#8+5BB#B5"D&/#+, /2%D, 2%+#+, &#-2%+, #+267FG#

e &+)#+, &#&332/+8#23#82%+, &/ "#A, 5+, /58+57 "8#5" 3B%&": &6# 0 2/&#+, 7 "#+, &# - 2%+, 6# h 2/+, &/ "# 32/ 0 &/#7<2B5+52 "58+8#A&/<B&#+2)#7 "6#656)#8%..2/+#+, &#V28+#17%88&2B2DFK#8&D/&D7+52 "#7 "6#\$5 0#

^{#(\$!2#3\$:*!}*N#*0+, *k*: \$\$*k*4\$13*k*!

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1/2A#B7A8#&T58+&6#5"#+, &#h 2/+, K#"2/+, &/"#1, /58+57"#:, %/:, &8#7B82#32%D, +#+2#075"+75"#+, &5/#/7:57B# 65;56&C#M,5+%./&07:F#,78#5"3B%&":&6#A,5+,/58+57"5+F#7:/288#90&/5:7#7"6#+,/2%D,2%+#5+8# ,58+2/F6# S 2/&2;&/)#:2"+&0 .2/7/F#/&8&7/:,#2"#1 ,/58+57"5+F#5"#9 0 &/5:7#/&;&7B8#+,7+#A ,5+&# 8%./&07:F#58#"2+#%"5`%&#+2#A,5+&#&;7"D&B5:7B8#"2/#+,&#-2%+,G#120.7/5"D#A,5+,/58+57"8#+2#"2"U /&B5D52%8#A,5+&#.&2.B"6#93/5:7"#90&/5:7"#1/2+&8+7"+8#7:/288#90&/5:7)#8,2A8#C8+7/PBF# 65; &/D&"+#2.5"52"8#7"6#<&, 7; 52/8#5"#.2B5+5:7B#8.7: &GE^{, '%}#H, &# '*=Z#IJJ^4C90 &/5:7"#p7B%&8# -%/;&FE#82%D,+#+2#D7%D&#+,&#/7:57B#7++5+%6&8#23#A,5+,/58+57"8#5"#90&/5:70#J&8&7/:,5"D# .&2.B&N8#/7:58+#2/#./&L%65:57B#;5&A8#58#:,7BB&"D5"D#<&:7%8&)#78#\$2"&8#.%+8#5+)#2"&#C2<;52%8BF# :7""2+#D&+#7::%/7+&#/&8%B+8#3/20#78P5"D#/&8.2"6&"+8#2%+/5D,+#A,&+,&/#+,&F#7/&#A,5+%./&07:58+8# 2/#/7:58+8#i<&:7%8&j#07"F#07F#<&#/&B%:+7"+#+2#/&;&7#+,&5/#+/%&#;5&A86#!/#+,&F#07F#./5;7+&BF# , 2B6 k ; 5&A8#+, 7+#+, &F#+, & 0 8&B ; &8#A2%B6#"2+#56&"+53F#A5+, #+, 28&#B7<&B8GE, **#H, 58#58#&; 56&" +#D5 ; &"# +,%:+#+,7+#A,&''#78P&6#7<2%+#+,&5/#D&''&/7B#3&&B5''D8#+2A7/68#93/5:7''#90&/5:7''8)#A,5+&# 1,/58+57"8N#3&&B5"D8#A&/"#.7/#A5+,#+,&#D&"&/7B#.2.%B7+52"6#X%+)#A,&"#78P&6#3%/+,&/#7<2%+# +,5"D8#B5PF8+&07+5:#5"&`%7B5+F)#8F0<2B8#23#A,5+%./&07:F)#2/#+,&#:/505"7B#L%8+5:F8+&0)# A,5+,/58+57"8#6&;57++/2"DBF#3/20#+,&5/#A,5+&#/&B5D52%8BF#%"7335B57+&6#7"6#<B7:P#I/2+&8+7"+# 9 0 &/5:7"#:2%"+&/.7/+8G^{, ''}##

H, &#I J J ^#32% "6#+, 7+#CZ@#. &/: & "+#23#A, 5+&#&; 7 "D&B5: 7B8)#?a#. &/: & "+#23#A, 5++, 2B5: 8)# 7 "6#?=#. &/: & "+#23#A, 5+&# 075 "B5 " &#I/2+&8+7 "+8 k #<&B5&; &#+, 7+#/7:57B# 05 "2/5+5&8#%8&#/7:58 0 #78#7 "# &T:%8 /#&: 2 "2 05: #5 " & `%7B5+5&8# 0 2/&#+, 7 "#+, &F#8, 2%B66E, `(#H, 58#58#5 "#: 2 0.7/582 "#+2#+, &#Ca '# . &/: & "+#23#/&B5D52%8BF#% "7335B57+&6#A, 5+&8E^{-, (*#}#7 "6#C@*#. &/: & "+#23#<B7: P#I/2+&8+7"+8E^{, ()}#A, 2#7D/&&0# H, 2%D, #A, 5+&#&; 7 "D&B5: 7B8#, 76#+, &#, 5D, &8+#. &/: & "+7D#7D/&& 0 & "+#+2#+, 7+#`%&8+52 ")#2+, &/#A, 5+&#

^{#(&}!2<mark>#3\$:*!*N#*0+, &: \$\$&4\$13*!, JK&!</mark>

^{!2#3\$:*!}*N#*0+, *k*: \$\$*k*4\$13*!, JK*k*! !2#3\$:*!*N#*0+, *k*: \$\$*k*4\$13*!, J4*k*!

^{!2#3\$:*!}*N#*0+, *k*: \$\$*k*4\$13*!, i 0*k*! !2#3\$:*!*N#*0+, *k*: \$\$*k*4\$13*!, i , *k*!

1,/58+57"8#A&/&#"2+#37/#<&,5"66#H,58#8%DD&8+8#+,7+#&;7"D&B5:7B8N#/7:57B#./&L%65::#"2+#%"5`%&#+2# +,&O#7"6#+,7+#A,5+%./&O7:F#58#B7:&6#+,/2%D,#7BB#23#A,5+	O&/5:7"#1,/58+57"5+F6#9665+52"7BBF)# 7#O7L2/5+F#23#A,5+,/58+57"8)#8+/5P5"DBF)#6587D/&&#A5+,#+,+7+&O&"+#+,7+#CiDj&"&/7+52"8#23# 8B7;&/F#7"6#658:/5O5"7+52"#,7;&#:/&7+&6#:2"65+52"8#+,7+#O7P+#65335:%B+#32/#<B7:P8#+2#A2/P#+,&5/# A7F#2%+#23#+,&#B2A&/#:B7886E.(+#M,5+&#&;7"D&B5:7B8N#B2"D#2/5&"+7+52"#+2A7/68#7"#5"65;56%7B58+5:# O5"68&+#7"6#+,&5/#%"6&/BF5"D#8&D/&D7+52"58+#+&"6&":5&8#:7"#,&B.#:B7/53F#A,F#+,&F)#5"#.7/+5:%B7/)# <&B5&;&#+,&#:2"8&`%&":&8#23#2"&N8#2A"#B53/#65/&:+#/&8%B+#23#2"&f8#2A"#7:+52"8#</p> 1, /58+57"^{(0, (\$#9665+52"7BBF)#\$2"&8#32%"6#+, 7+#+, &# 02/+&"#7#A, 5+, /58+57")#&8.&:57BBF#7#A, 5+&# &; 7"D&B5:7B)#A&"+#+2#:, %/:, #+, &# 02/&#B5P&BF#+, &F#A&/&#+2#, 7; &#/7:58+#2.5"52"86^{, (%}#^"; &/8&BF)# 7++&"65"D#:, %/:, #B&88#3/&`%&"+BF#656#"2+#5"65:7+&#+, 7+#A, 5+, /58+57"8#A2%B6#<&#B&88#B5P&BF#+2# , 2B6#/7:58+#2.5"52"8K#5"#2+, &/#A2/68)#+, 58# 0&7"8#+, 7+#7#. &/82"#:7"#8+5BB#<&#/7:58+#&; &"#53#+, 7+#. &/82"# 62&8"N+#D2#+2#:, %/:, #2/#58"N+#1, /58+57"6^{, (&}#H, C+7#3/20#\$2"&8#7"6#+, &#IJJ^*#8, 2A8#+, &#+/2%<B5"D# .7++&/"#+, 7+#+, 58#58#"2+#L%8+#7#82%+, &/"#., &"20&"2")#"2/#58#5+#L%8+#7#A, 5+&#&; 7"D&B5:7B#}

 5"65:7+&8#+,7+#+,&#A,5+&#&;7"D&B5:7B8#7"6)#O2/&#D&"&/7BBF)#A,5+,/58+57"8#23#+267F#7/+5BB#"2+# O7P5"D#7"F#:,7"D&#+2#+,&5/#<&B5&386#

H,58#:2"+&O.2/7/F#/&8&7/:,#,&B.8#+2#&T.B75"#A,F#J&7D7")#/7+,&/#+,7"#+,&#B5<&/7B#\$5OOF# 17/+&/)#&"6&6#%.#</5"D5"D#&;7"D&B5:7B8#5"+2#.2B5+5:7B#7:+5;58O#5"#+,&#B7+&#+A&"+5&+,#:&"+%/F6#9"6)# +,58#/&8&7/:,#58#P&F#+2#&T.B75"5"D#:2"+&O.2/7/F#&;7"D&B5:7B#8%..2/+#32/

S 28+#5 0 . 2/+7"+BF)#7"6#7B82#; &/F# 0 %: ,#B5P&# J &7D7")#H/% 0 . #58#7<B&#+2#B&D5+5 0 5_&# &; 7"D&B5:7B8N#2 . . 285+52"#+2#"2"U&; 7"D&B5:7B#; 7B%&8#7"6#<&B5&38#"2+#78# . /&L%65: &)#<%+#78#7"#7++& 0 . +# +2# . /2+&: +#9 0 &/5:7"#; 7B%&8#A , 5: ,)#5"#+%/")#, &B . 8#+2#2<8: %/&#+ , &#% "6&/BF5"D# . /&L%65: &G#H/% 0 . # 3/7 0 &8#&; &/F+ , 5"D#<&856&8#A , 5+&#&; 7"D&B5:7B#5" 3B%&": &N#67"D&/2%8)#: 2//% . +5"D)#7"6#7"+5+ , &+5:7B# +2# 9 0 &/5:7#5"#7# 0 7""&/#+ , 7+#7BB2A8#A , 5+&#&; 7"D&B5:7B8#

/&8.2"85<5B5+F#+2#756#"2"UA,5+Z&/5:7"8N#8+/56&8#+2A7/6#&`%7B5+FG#J&7D7"N8#/,&+2/5:#32:%85"D# 2"#&;7"D&B5:7B8N#&0<7++B&0&"+#7"6#;7B%&#A5+,5"#.2B5+5:8#A78#7"#50.2/+7"+#;&,5:B"#</5"D5"D#+,58# X5<852D/7.,F

958+/%.)#\$28&.,#96# \$-H ! J6! G#hG.GW#4"5; &/85+F#I/&88#23#o&"+%:PF)# =>> G#

9+A7+&/)#V&&G#^"+&/;5&A#<F#9B&T7"6&/#V7058G#9%652)#(=WaZG#OT:B%85;&W#V&	+A7+&/f8#^"3702%8# =>Z=#^"+&/;5&A#2"#+,&#-2%+,&/"#-+/7+&DFG#h2;&0<&/#=@)#'*='G#9::&88&6#9./5B#'@)#'*'(G# ,++.8WYYAAAG+,&"7+52"G:20Y7/+5:B&Y7/.2(7)0\$9457589.0""h#1432(aZG#O)0.2(T0.2((7).2(5)0.2(2D/

V7BBF)# o 7+, FG#q 9 #L2%/ "&F#3/2 0 #/7:58 0 #+2#/&782 "#h &A8.7. &/\\"#H, &# 1 B7/52 "UV&6D&/#23#\\$7:P82")# S 5886)#A78#2 ": &#+, &# 0 28+#/7:58+#.7. &/#5"#+, &# 4 "5+&6# - +7+&8)#\% "+5B#7 "#2338./5"D#23#+, &# .%<B58,5"D#37 0 5BF#6&:56&6#+2# 0 7P&#+, &#.7. &/# 1 #7"6#,58#37 0 5BF#"7 0 &# 1 #/&8. &:+7<B&Cq# #bX7B+5 0 2/&)# S g c)#\\$7"\%7/F#a)#=>>?G# 9 :: &88&66# 9 ./5B# '@)# '* ' (G# ,++.8\\YAAA6<7B+5 0 2/&8\% "6: 2 0 Y=>>?Y*=Y*aY7UL2%/ "&FU3/2 0 U/7:58 0 U+2U/&782 "U"&A8.7. &/U +, &U:B7/52 "UB&6D&/U23UL7:P82 "U 0 588UA78U2 ": &U+, &U 0 28+U/7:58+U.7. &/U5"U+, &U\% "5+&6U8+7+&8U % "+5BU7"U2338./5"DU23U+, &U. %<B58,5"DU37 0 5BFU6&:56&6U+2U 0 7P&U+, &U.7. &/U7Y6!

V&.58+t)#9"++50#

G#1,5:7D2W#4"5;&/85+F#23#1,5:7D2#I/&88)#'*'=G!

V&A58)#9 "6/&A#JG#

G = hG.G = 170 < /56 = 41) = @*'G!

 $q \ S \ 7 L 2/5 + F \# 23 \# I \ \% < B5: \# g \ 587.../2; \ \& 8 \# 23 \# - \%../\& \ 0 \ \& \# 1 \ 2\%/+f \ B \# g \ \& : 5852'' \# H2 \# !; \ \& /+\%/'' \# J \ 2\& \#; \ G \# M76\& \ G \# G \# V78 + \# 0 \ 26535\& \ G \# \% B F \# '') \# '* '' \ G \# U \ A

,++.8\\YAAAG.&A/&8&7/:,G2/DY.2B5+5:8\'*''*?*\YO7L2/5+FU23U.%<B5:U6587../2;&8U23U 8%./&O&U:2%/+8U6&:5852"U+2U2;&/+%/"U/2&U;UA76&YG!

S &B+2")#Q2/62"#\$6#qO;7"D&B5:7B#1,%/:,6q#^"# '*)#'*'(6#9::&88&6#9./5B#'\)#'*'(6#,++.8WYYAAA6</5+7""5:76:20Y+2.5:YO;7"D&B5:7BU :,%/:,UI/2+&8+7"+5806!

S 5BB&/)#-+&;&"#IG#

4''5; &/85+F#I/&88)#'*=(6!

h &B82")#9""&G#

e 2/PW#XB2208<%/F#I%<B58,5"D)#'*=>6!

 $\label{eq:headsolution} \begin{array}{l} \label{eq:headsolution}

- h D%Fu")#9""#H,vF)#7"6#S7F7#I&"6B&+2"6#qJ&:2D"5_5"D#J7:"#V7"D%7D&W#M,F#M.5+7B5_&# fXB7:Pf#7"6#fM,5+&6fq#1&"+&/#32/#+,&#-+%6F#23#-2:57B#I2B5:F6#V78+#026535&6#S7/:,#'@)# '*'*6#9::&88&6#S7F#>)#'*'(6#,++.8WYY:88.62/DY'*'*Y*@Y/&:2D"5_5"DU/7:&U5"UB7"D%7D&U A,FUA&U:7.5+7B5_&U<B7:PU7"6UA,5+&Y6!
- q=>\(6q#H,Z&/5:7"#I/&856&":F#I/2L&:+6#9::&88&6#9./5B#'\)#'*'(6# ,++.8WYYAAA6./&856&":F6%:8<6&6%Y8+7+58+5:8Y&B&:+52"8Y=>\(6!

(#9%D%8+7)#Q9)#=Z(aG#9::&88&6#9./5B#

'@)#'*'(G#,++.WYY<7.+58+8+%65&82"B5"&G:20YA.U:2"+&"+Y%.B2768Y'**?Y*'Y:2"8+5+%+52"U23U +,&U8<:G.636!

G#h&A#

G# ! T32/6W# ! T32/6#

- , &BB&F#; G# o /7& O &/)#@@(#4G-G#=#b S 7F#@)#=>(ZcG#9::&88&6#9./5B#=\)#'*'(G#