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! &'(!)'!*#+!,-.\$/#/012!345#06!"7!*-#/2\$6!3/8-#26-9069-1:!7!;#21!<69.=!'8!"'2! $7 \mathbin{/}\!\!>\!\!1?12! @ 16-\ 'A2! \ ; \ 7 \ 7 \ B!B \ ' ?\$0\$12! \# / \ . ! \negthinspace <\!\! 6\text{-}\#61 \negthinspace >\!\! \$12!$! ! C?\$D#E16F!"#\$! <5-\$/>!GHGG! ! !

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'8!6#+!'-.\$/#/01!6-#/2\$6!\$/J12641/6!#/.!09--1/6!26-#61>\$12!@16-'!145?'=2!\$/!'-.1-!6'!\$45?141/6! ; 77B!5'?\$0\$12R!!

E! 7 (\$'5\\#&\\\$''(\\7\\#\4\\F'\#4\&\\\?)) (420\\\

6-#/25'-6#6\$'/!5?#//1-X!0''-.\$/#6'-X!.12\$>/1-2X!E9\$?.1-X!#/.!'51-#6'-!8'-!6F1!"'2!7/>1?12!;'9/6=\text{R!} @16-'!(#2!8'-41.!\$/!%UMM!'96!'8!#!41->1-!'8!6F1!<'96F1-/!:#?\$8'-/\$#!Q#5\$.!*-#/2\$6!)\$26-\$06!#/.! 6F1!" '2!7 />1?12!; '9/6=!*-#/25'-6#6\$'/!; '44\$22\$'/R!36!0'/2\$262!'8!2\$+!?\$/12!#/.!/\$/16=c6F-11! $0'9/6 = \frac{12!}{(1??!#2!62!8'9 - \frac{129}{(1??!#2!62!8'9 - \frac{129}{(1.5)} - \frac{129}{(1.5)} - \frac{129}{(1.5)}}$ 210' / . !\$/!6F1!0' 9/6-=!E=!-\$. 1-2F\$5!#/ . !2\$D1! '8!8?116R^m!WF\$?1!E126!O/ ' (/ !8 ' - !\$62!E9212!#/ . !6-#\$/2X! @16-'!-9/2!#/.!'J1-2112!4#/=!'6F1-!0-\$6\$0#?!6-#/25'-6#6\$'/!5-'>-#42\\\0009\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\0009\\000 89/.\$/>!5-'>-#42X!'51/!26-1162!\$/\$6\$#6\$J12X!#/.!-#\$?!26#6\$'/!#-1#!-1#?!126#61!.1J1?'541/6R^V!36!\$2!#?2'! \$45'-6#/6!6'!#..!6F#6!(F\$?1!@16-'!'51-#612!6-#\$/2!#/.!E9212\!\\$6!.'12!/'6!F#J1!#96F'-\\$6=!6'!4#/#>1! 26-1162R!*F\$2!#96F'-\$6=!-14#\$/2! (\$6F!?'0#?!0\$6\$12R!T9/.\$/>!8'-!@16-'!#/.!\$62!5-'>-#42!#/.!5-'K1062! #-1!E'6F!#6!#!26#61!#/.!81.1-#?!?1J1?R!"7!@16-'!#?2'!21-J12!#2!6F1!6#+!#96F'-\$6=!#/.! \$45?141/6#6\$'/!#>1/0=!8'-!J'61-!#55-'J1.!2#?12!6#+!41#29-12\tilde{8}!7..\tilde{8}\tilde{8}'/#??=\tilde{1}!4'/1=!8-'4!8'9-! "7!; '9/6=!2#?12!6#+12!#?' /1!/' (!#00'9/62!8'-!#E'96!mH!51-01/6!'8!@16-'A2!E9.>16\(\)!290F!#2!B-'5! 7!\$/!\$U\HX!B-'5!;!\$/!\$UUHX!@1#29-1!Q!\$/!GHH\X!#/.!@1#29-1!@!\$/!GH\VR\!*F121!8'9-!F#?8c01/6!

^M!@16-'X!`7E'96!@16-'!7-0F\$J1Xa!"7!@16-'!Z@16-'X!GHGG[X!F6652^bb(((R416-'R/16b#E'96bR!

[&]quot;!W#=N#00!@#0F\$/1\"!`T#062!76!#|Y?#/01\\\a!W#=E#00!@#0F\$/1^!3/61-/16!7-0F\$J1\\!n'J14E1-!\\\\!GH\\V\!

 $[\]underline{F6652\%b} \text{ (1ER\#-OF\$J1R'->b (1EbGH\%V\%GGmH\wlmPbF6652\%b (((R416-'R/16b/1 (2b8\#062c>?\#/01bR!)) } \underline{F6652\%b} \text{ ((R416-'R/16b/1 (2b8\#062c>?\#/01bR!) } \underline{F6652\%b} \text{ ((R416-'R/16b/1 (2b8\#062c)?\#/01bR!) } \underline{F6652\%b} \underline$

 $[\]frac{v!}{n\#6F\#/!<\&!\&'?412\&!}"\#!Q1>\&''/\#!!*-\#/25''-6\#6\&'/\&!C+5?\#\&'1.\&!@1.\$94!Z@1.\$94!Z@1.\$94!T1E-9\#-=!\%!!GHGH[X!F6652\%b/2F'?412G\%k41.\$94\&0''4b?\#c-1>\&''/\#!C6-\#/25''-6\#6\&''/c1+5?\#\&'1.c#MMGmM8MVGSEk!$

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\$\\\8-\\\26-9069-1\\\81\\\15\\\26\\\12\\\15\\\81\\\1-\\\81\\\1-\\\81\\\1-\\81\\\81\\\1-\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\81\\\

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GHHU%\R!*F1!5#22\$\/>!\8!6F1!GHH\!6#+!\-\\$\/#\/01\X!\(\F\21!\-1\J1\/91!25#\-01\.!6F1!\-\\$\J1!8\-\!59E?\\$0!\

89\/\.1\.!0\'\/26\-906\\$\'\/!6\'!26#\-6!6\'!E9\\$?\.!\'96!59E?\\$0!6\-#\/2\\$6\X!\.14\'\/26\-#612!6F1!\>\-\\(\\$\/\)\\\$2955\'\-6!8\'\-!6F1!\\
0\'\/6\\$\/9\#?!\.1\J1?\'54\1\/6!\'\8!6F1!\"\7\!59E?\\$0!6\-#\/2\\$6!2\=261\4\!\\$\/\!#\!0\\$6\=!6F\#6!F\\$26\'\-\\$0\\#??\=\!5\-\\$\'\-\\$6\\D1\\.!\\
J1F\\$0\?\2\%\B!\

F121!89/.2!#-1!.\$26-\$E961.!E=!6F1!" '2!7/>1?12!; '9/6=!@16-'5'?\$6#/!-#/25'-6#6\$'/!

796F'-\$6=!4'/6F?=!6'!K9-\$2.\$06\$'/2!'/!#!51-!0#5\$6#!E#2\$2R!@1#29-1!Q!2510\$8\$12!6F#6!6F1!89/.2!#-1!

96\$?\$D1.!8'-!6-#/25'-6#6\$'/!59-5'212!'/?=R!@1#29-1!Q!F\$>F?\$>F62!(F\$0F!5-'K1062!F#J1!1?\$>\$E\$?\$6=!8'-!

89/.\$/>!#/.!`K9-\$2.\$06\$'/2!#-1!1/0'9-#>1.!6'!#55?=!6F1\$-!@1#29-1!Q!"Q!89/.2!6'(#-.2!49?6\$c

K9-\$2.\$06\$'/#?!5-'K1062X!2510\$8\$0#??=!5-'K1062!6F#6!2955'-6!'6F1-!@1#29-1!Q!-#\$?X!E92!#/.!F\$>F(#=!

@'-1'J1-X!6F1!@1#29-1!Q!"'0#?!Q169-/!5-'4'612!2926#\$/#E\$?\$6=!(F1/!89/.\$/>!6-#/2\$6!

5-'K1062R!j9-\$2.\$06\$'/2!#-1!1/0'9-#>1.!6'!96\$?\$D1!@1#29-1!Q!89/.2!8'-!5-'K1062!6F#6!8'261-!

2926#\$/#E?1!0'9/6-=(\$.1!6-#/25'-6#6\$'/!2=26142!E=!\$/0-1#2\$/>!#?61-/#6\$J1!6-#/25'-6#6\$'/!0F'\$012!

#/.!\$45-'J\$/>!6F1!188\$0\$1/0=!#/.!'51-#6\$'/!'8!6F1!26-1162!#/.!\$/8-#26-9069-1R!!3/0?9.1.!#-1!

2510\$8\$0!0''-.\$/#6\$'/!#55-'#0F!?\$26\$/>2!8-'4!@1#29-1!Q!"'0#?!Q169-/!Y9\$.1?\$/12!#E'96!

.10#-E'/\$D#6\$'/!5-'K1062!9/.1-!@'565\$(%Y+&\$#*4#/*,*\$0^!!

- %R @ '-1!0'--\$.'-cE#21.!5-'K1062X!2510\$8\$0#??=!6F'21!6F#6!2955'-6!'6F1-!@1#29-1!Q!-#\$?X!E92! #/.!F\$>F(#=!0'--\$.'-2!
- GR N92!-#5\$.!21-J\$01!\$45?141/6#6\$'/!
- MR N\$01!#/.!51.126-\$#/!#00122!#/.!0'//106\$J\$6=!6'!2955'-6!6-#/2\$6!#/.!-#\$?!26#6\$'/2!
 7?2'\!?'0#?!#>1/0\\$12!#-1!1/0'9-#>1.!6'!4#+\\$4\\$D1!6F1!921!'\\$!6F\\$2!89/.\\$/>!-12'9-01!6'!-1.901!
 >-11/F'921!>#2!14\\$22\\$'/2!#/.!\\$45-'J1!4'E\\$?\\$6=!#/.!#00122!6'!?'0#?!0'449/\\$6\\$12\!C+#45\\$?12!'\8!

! "#\$!U

5-'K1062!\$/0?9.1!`?\$J#E?1!26-1162X!0' 45?161!26-1162X!0#-!2F#-\$/>!5-'>-#42X!5#-O\$/>!5-\$0\$/>!
26-#61>\$12!#/.!'6F1-!#06\$'/2!6'!-1.901!0'/>126\$'/!#/.!J1F\$0?12!4\$?12!6-#J1?1.R!N=!#661456\$/>!6'!
89/.!4'-1!\$/8-#26-9069-1!#/.!-#\$?!5-'K1062!6'!E9\$?.!'96!#/.!26-1/>6F1/!59E?\$0!6-#/2\$6X!6F121!?\$26\$/>2!
8-'4!@1#29-1!Q!#?2'!5-'4'61!6F1!188'-62!6'(#-.!.10#-E'/\$D#6\$'/^{G%}R!!

*TE! 7 (#&+'(%7%

@1#29-1!@A2!>'#?2!#-1!6'!4\$6\$>#61!1/J\$-'/41/6#?!1881062!8-'4!Y&Y!14\$22\$'/2X!>-'(!#/!

188\$0\$1/6!#/.!2#81!59E?\$0!6-#/2\$6!2=2614X!#/.!1/F#/01!6F1!; '9/6=A2!-1>\$'/#?!6-#/25'-6#6\$'/!2=2614!

E=!\$/J126\$/>!\$/!0#5\$6#?!\$45-'J141/62!\$/!@16-'A2!E92!2=2614!#/.!-#\$?!2=26142R!@1#29-1!@!('9?.!
.'9E?1!6F1!2\$D1!'8!6F1!-1>\$'/2!4#22!6-#/2\$6!2=2614!#/.!95.#61!"'2!7/>1?12!; '9/6=A2!F\$>F(#=X!

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%7 %6'>16F1-X!6F\$2!('9?.!E1!#!F\$>F?=!2\$>/\$8\$0#/6!6-#/28'-4#6\$J1!\$/J12641/6!6'!E'6F!5-'4'61!6F1!

92#>1!'8!6-#/2\$6!#/.!6'!4#01!6-#/25'-6#6\$'/!\$/!"'2!7/>1?12!2#81-X!1#2\$1-!#/.!4'-1!0'/J1/\$1/6R!!

TE! 7 (\$'59&%>,*6#\$(%?2\$*54\\\#4.\\?.\#1\$\\\\$*54\\@,\#4\\\A>??@B\\

" '2!7/>1?12!; '9/6=!@16-'5'?\$6#/!*-#/25'-6#6\$'/!796F'-\$6=X!'-!@16-'X!5-15#-1.!#/!

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8?116X!2 (\$60F!J#/5''?!J1F\$0?12!6'!E#661-=c5' (1-1.!J1F\$0?12X!-15?#01!/'/c-1J1/91!J1F\$0?12! (\$6F! E#661-=!5' (1-1.!J1F\$0?12X!\$/26#??!2=261 4 2!6'!26'-1!1/1->=!0#569-1.!8-' 4 !6-#\$/2X!E9=!%HH g ! -1/1 (#E?1!1/1->=X!\$/26#??!5F'6'J'?6#\$0!2=261 4 2X!

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E1\$/>!89/.1.!E=!GHH\!@1#29-1!Q!#/.!GH%V!@1#29-1!@!#-1!\$/0'45?161!(\$6F!1/.!.#612!\$/!6F1! 61/6#6\$J1!8969-1R!W\$6F!'/?=!#!81(!5-'K1062!0'45?161.X!0'45-1F1/2\$J1!269.\$12!'8!6F1!2926#\$/#E\$?\$6=! ! "#\$!%M

188\$0\$1/6!921!'8!59E?\$0!6-#/25'-6#6\$'/X!#/.!6F1!0'/26-906\$'/!'8!E\$0=0?1!?#/12!#/.!4#22!6-#/25'-6!
?#/12^{M%}R!3/!4#/=!0#212!6F#6! (\$??!41#/!\$/J126\$/>!\$/!6-#/2\$6!\$/8-#26-9069-1!#/.!F\$>FcJ'?941!8\$+1.c
-'961!6-#/2\$6!21-J\$012!290F!#2!0'44961-!-#\$?X!?\$>F6!-#\$?X!#/.!E92!-#5\$.!6-#/2\$6X!#?'/>! (\$6F!-1?\$#E?1!
?'0#?!E92!21-J\$012R!!

**E! M(&*)4#\$(.\N+4.*4)\\#&\\#\Y(2+'(\\85+\\$(\\F5H\#'.\\F'\#4&*\\M(2\H'/54*-\\\$*54\\\ *-#/25'-6!10'/'4\$262!N#--=! I EE1?2!#/.!B161-!n\$KO#45!F\$>F?\$>F62!6F#6!2955'-6!8'-!6-#/2\$6! -1J1/912!8-'4!#!(\$.1!/94E1-!'8!29E2\$.\$12X!?'0#?!6#+12!#/.!0F#->12!F#J1!E11/!5-\$4#-=!2'9-012!'8!6-#/2\$6!89/.\$/>R! 72!6F1-1!\$2!9/5-1.\$06#E\$?\$6=! (\$6F!6F\$2!416F'.X!6-#/2\$6!\$2!4'-1!J9?/1-#E?1!6'!=1#-?=! 0#2F!8?' (2!0#92\$/>!#>1/0\$12!6'!5-\$'-\$6\$D1!.1J1?'541/62!#/.!4#01!9/5'59?#-!#/.!0F#??1/>\$/>! . 10\$2\$' / 2!6' !096!21-J\$01!' -!-#\$21!8#-12!. 9-\$/>!51-\$' . 2! '8!?' (!-1J1/912R^{MG}! 72! 4 '26! '8!6F1!89/ . 2! '-\$>\$/#61!8-' 4!6F1!2#41!#22'-641/6!'8!-1J1/91!2'9-012!8'-!'6F1-!59E%0!21-J\$012X!%01!1.90#6\$'/! #/.!F1#?6FX!6F1-1!\$2!/'!.\$-106!?\$/0!E16(11/!6F1!2'9-01!'8!-1J1/91!#/.!\$62!.1.\$0#6\$'/R^{MM}!<90F! 9/5-1.\$06#E\$?\$6=!\$2!#?2'!#!0#921!8'-!9/5-1.\$06#E?1!5-'K106!89/.\$/>!(\$6F!/'!#229-#/01!8'-!0'/6\$/9#?! 8\$/#/0\$/>R!; '4516\$6\$'/!8'-!89/.\$/>!6F1/!0-1#612!#!4#K'-!5-'E?14!(\$6F!6F\$2!8'-4!'8!8\$/#/0\$/>R! *F\$2!E10'412!5-'E?14#6\$0!.91!6'!6F1!/11.!8'-!2\$D1#E?1!#4'9/62!'8!4'/1=X!'J1-!?'/>!51-\$'.2!'8! 6\$ 4 1\!6'!E9\\$?.!#/.!.1J1?'5!59\E?\\$0!6-#/2\\$6!5-'\K1062\R!!*\F1!/10122\#-=!\\$/J1264 1/62\\\$/!2926\#\\$/\#E?1! \$/8-#26-9069-1!2=261 4 2!0#//'6!E1! 4 # . 1! (\$6F' 96!29\$6#E?1!89/ . \$/>! 4 10F#/\$2 4 2R!T'-!6F\$2!-1#2'/X! #96F'-\$6\$12!#/.!6-#/2\$6!'51-#6'-2!#-1!5-\$'-\$6\$D\$/>!/1(!.12\$>/#61.!2'9-012!'8!89/.\$/>!8'-!6-#/2\$6!?\$01!

 $^{@\$//12&#}x27;6\#X!T1E-9\#-=!GGX!GHHVR!F6652\%b(((R-121\#-0F)+61R/1605-'8\$?1b@\$0F\#1?3\#0''/'b59E\%0\#6\'/bGmmmS\%MPr)1.\$0\#61.rT9/.\$/>!r\#/.rI-E\#/r*-\#/2\$6rB1-8'-4\#/01r<'41rC45*-$0\Pi^2.1/01b*/02bHHEPUmMSG\#0M8\%MM\#HHHHHHb)1.\$0\Pi61.cT9/.\$/>c\#/.c$

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 $F=5 '6F10\#61 . !?' 0\#?!6\#+\#6\$' / \mathbb{N}^{MP}!\&=5 '6F10\#61 . !?' 0\#?!6\#+\#6\$' / !-181-2!6' !\# / !\#22'-64 1/6! '8!?' 0\#?!6\#+12! \\ \# / . !0F\#->12! (F'21!-1J1/91!\$2! .\$-106?=!F=5 '6F10\#61 . !\# / .! .1 .\$0\#61 . !6' !8\$ / \# / 01!6F1! '51-\#6\$' / \$! \\ . 1J1?' 5 4 1/6\mathbb{N}!# / .!\mathbb{N} / 126 4 1/6! '8!59E?\mathbb{N}0!6-\#/25' '-6!\mathbb{H} / .!\mathbb{N}62!0' '262\mathbb{N}^{Mm}! @ '26!0' '4 4 ' /?=\mathbb{N}!\mathbb{H}861-! 'E6\mathbb{H}861-! 'E6$

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''#\$!%\

89/.2!(1-1!#201.R!72!6F1!26-#61>\$12!6'(#-.!.10#-E'/\$D#6\$'/!6F#6!@16-'!.120-\$E12!(#2!92\$/>!6#+!
'-.\$/#/01!89/.\$/>!6'!E9\$?.!'96!4'-1!59E?\$0!6-#/2\$6!\$/8-#26-9069-1\$!6F1!]9126\$'/!'8!(F16F1-!6F\$2!\$2!
#/!188106\$J1!26-#61>=!#/.!(F=!(#2!#201.!6'!6F121!#.J'0#0=!>-'952R!!

E! R4\$('T(H((&\%C*&\$!

!

n#41!	Y-'95!
3/61-J\$1 (11!7!	7 (\$'5^!C/J\$-'/41/6#?!<1-J\$012!) 15#-641/6!
3/61-J\$1 (11!N!	7 (\$'5^!C/J\$-'/41/6#?!; '45?\$#/01!

! "#\$!%U

T'-!4=!-121#-0FX!3!0'/.9061.!8'9-!\$/61-J\$1 (2!(\$6F!@16-'!#>1/0=!414E1-2!(\$6F\$/!6F1!

C/J\$-'/41/6#?!
15#-641/6#?!
15#-641/62!E16 (11/!j#/9#-=!#/.!T1E-9#-=!GHGGR!7..\$6\$'/#??=X!3!\$/61-J\$1 (1.!G!414E1-2!'8!

J#-\$'92!0%4#61!#/.!6-#/2\$6!#.J'0#0=!>-'952R!3!\$/61-J\$1 (1.!'/1!414E1-!'8!6F1!'->#/\$D#6\$'/!

Y\$'((\$&\35'\%?,,\#/.\#/'6F1-!8-'4!>,*6#\$(\86(\&5,T(R)T'-!6F1!59-5'21!'8!6F\$2!5#51-X!#??!@16-'!

\$/61-J\$1 (112!#-1!#/'/=4'92X!E96!#??!.15#-641/62!51-6#\$/!6'!;77BX!@1#29-1!Q!#/.!@1#29-1!@R!!

*F-'9>F!6F1!\$/61-J\$1 (2!0'/.9061.!(\$6F!E'6F!#.J'0#0=!>-'952!#/.!@16-'!#>1/0=!

414E1-2X!6F1-1!(#2!#!>1/1-#?!0'/21/292!'8!#00156#/01!'8!6F1!\$/8-#26-9069-1!#/.!'51-#6\$'/2!

.10#-E'/\$D#6\$'/!26-#61>\$12!#/.!6F1!GH%U!;%4#61!706\$'/!#/.!7.#56#6\$'/!B?#/!8-'4!@16-'R!*F1!

5?#/!#/.!\$62!0'/61/62!51-6#\$/\$/>!6'!.10#-E'/\$D\$/>!'51-#6\$'/2!#/.!5''?\$0=!>'#?2!(1-1!>1/1-#??=!

(1??c-101\$J1.!#/.!.1141.!-1#?\$26\$0#??=!\$45?141/6#E?1R!N'6F!@16-'!#/.!#.J'0#0=!414E1-2!

#>-11.!'/!6F1!/11.18'-!4'-1!#00122\$E?1!#/.!#88'-.#E?1!59E?\$0!6-#/2\$6!\$/8-#26-9069-1!#2!(1??!#2!

4 969#?!> '#?2! '8!6-#/2\$6!. 10#-E '/\$D#6\$ '/R!7 ?6F '9>F!6F1!5 '?\$6\$0#?!\$ 4 5?\$0#6\$ '/2! '/!6F1!-1#?\$26\$0!

! "#\$!GH

```
%R *#+!'-.$/#/012!GHH\!@1#29-1!Q!#/.!
GH%V!@1#29-1!@!5-'J$.1!89/.$/>!8'-!
6F1!

N9$?6!$/!#00'-.#/01!
($6F!@16-'A2!<926#$/#E$?$6=!B?#/X!
(F$0F!0'/6#$/2!;77B!($6F$/!$6X!#2!6F1!
4#$/!26-#61>=!6'!.10#-E'/$D1!
!
GR W$6F$/!6F#6X!GH%U!;77B!5'?$0$12!#?2'!
F1?5!
!E=!
```

! "#\$!GG

 $\begin{array}{l} n \ '6! \ '/?=!\#-1! \ (1!6-=\$/>!6'!.10\#-E'/\$D1!E96!/'6!6'!-1c0\#-E'/\$D1 L @ 16-'!F\#.!\#! \ 4116\$/>! \\ \#E'96!6F1\$-!.\$881-1/6!26-\#61>\$12!\$/0?9.1.!6F1!5-'K1061.!8''65-\$/6!'8!1+5\#/.\$/>!8-11 \ (\#=2\$! \$F1!\$/0?92\$'/!'8!8-11 \ (\#=!4'/1=!\#/.!\$451692!8'-!1+5\#/2\$'/!6F1-1!-1\#??=!K1'5\#-.\$D12! \\ 0?\$4\#61!\#06\$'/\$!*F1!]9\#/6\$6=!'8!>-11/F'921!>\#212!6F\#6! \ ('9?.!E1!14\$661.!-1?\#61.!6'!5?\#//1.! \\ 1+5\#/2\$'/!'8!8-11 \ (\#=2!\$2!>-1\#61-!6F\#/!\#??!'8!6F1!\$/8-\#26-9069-\#?!\$/J12641/62!'8!@ 16-'! \\ 0'4E\$/1.X!6F\#6!\$2! \ (F\#6!6F1\$-!.-\#86!126\$4\#612!2\#=\$!36A2!/\$01! \ (F1/!='9!6\$1!\#06\$J1!6-\#/2\$6!6'! \\ F\$>F \ (\#=!\$45-'J141/62X!E96!\$8!='9-!\$/.90\$/>!.14\#/.!8'-!.-\$J\$/>!\$6!5-'4'612!\#!21/21!'8!\#! \\ D1-'c294!>\#418!; \#/A6!1/0'9-\#>1!.-\$J\$/>!\#/.!-\$.$/>!\#!E$01!#6!6F1!2#41!6$418! \\ \end{array}$

W\$6F\$/!6F1!\$/61-J\$1 (2X!6F1-1! (#2!#!>1/1-#?!0'/21/292!6F#6!6#+!'-.\$/#/01!@1#29-1!Q!#/.!
@1#29-1!@!\$2!#!E1/18\$6!6'!@16-'!#/.!6F1!6-#/2\$6!2=2614!#2!#! (F'?1R!*F121!6 ('!@1#29-12! (1-1!
#/#?=D1.!2510\$8\$0#??=!#2!6F1=!#-1!J\$1 (1.!#2!6F1!/1+6!2615!8'-!6-#/2\$6!89/.\$/>!5-'K1062!\$/!" 7R!
@1#29-1!@!\$2!96\$?\$D1.!#2!#/!1+5#/2\$'/!'8!6F1!'-\$>\$/#?!@1#29-1!Q!6#+!'-.\$/#/01R!36!\$2!.\$26\$/06!.91!
6'!6F1!?#->1!20#?1!'8!89/.2!#/.!/'!29/216!.#61R!*F\$2!?#->1!\$/0-1#21!\$/!#J#\$?#E?1!89/.\$/>!\$2!0-\$6\$0#?!

$$\begin{split} &I\ ?6\$\ 4\ \#61?=!\ @\ 1\ \#29-1!\ @\ !\ (\ \#2!6\#0\$/>!\ @\ 1\#29-1!\ Q!6\ '\ !6F1!/1+6!?1\ J1?!\$/!61-42!\ '8!6F1!5-'K1062!\$6!\\ &(\ \#/62!6'!5-'J\$.1!6'!''\ 7!;\ '9/6=R!''\$01!6\ (\ '!'8!6F1!F\$>F?\$>F62!'8!6F\#6!2510\$\$0!6\#+!4\ 1\#29-12!\$2!\\ &GH!'-!2'!5-'K1062!6F1=!\ (\ \#/6!6'!1/\#06!95!9/6\$?!GHmHR!CJ1/!\ (\ \$6F!6F'21!5-'K1062!\$/!4\$/.!\ (1!\ (\ \#/6!6'!>16!.'/1X!6F1-1!\$2!/'!29/216!.\#61!'/!6F\#6!4\ 1\#29-1!\ (\ F\$0F!\ 4\ 1\#/2!6F\#6!\$/!6F1!8969-1!\$8!\ (1!26\$??!F\#J1!6\#+!-1J1/91!0'4\$/>!\$/6'!@16-'!\#/.!6F1-1!\$2!'EJ\$'92?=!26\$??!/11.!8'-!6-\#/2\$6!\ 5-'K1062X!F1-1A2!\#/!'55'-69/\$6=!6'!0'/6\$/91!6'!\$45-'J1!'9-!.10\#-E'/\$D\#6$'/!188'-62!\$/!6F1!$$

! "#\$!GM

#. '56\$/>!0?1#/!891?!#/.!610F/'?'>=!#?61-/#6\$J12!6'!.10#-E'/\$D1!6F1!6-#/2\$6!2=261 4 !E=!GHmHRPS!

WF1/!#201.!#E'96!6F1!\$/61-2106\$'/!E16(11/!6F1!6#+!41#29-12!#/.!;77BX!3/61-J\$1(11!N!
.120-\$E12X!!

N10#921!@1#29-1!@!#/.!Q!.'12!#!?'6!'8!6F1!F1#J=!?\\$6\\$/>!'8!6F1!C@*!-1.906\'/2\!6F1! ; 7 7 B!\\$2!F'(!(1!\\$45-'J1!95'/!6F#6\!&'(!0#/!@16-'!4#01!5-'\\$1062!4'-1!2926#\\$/#E?1!#/.! F1?589?!6F-'9>F!6F121!24#??1-!41#29-12:!!

7 . . \$6\$ ' /#??=X!#?6F ' 9>F!@1#29-12!Q!#/ .!@1#29-1!@! . '!/ '6! .\$-106?=!2955 '-6! ; 7 7 BA2!5 ' ?\$0\$12X!
6F1=! . '!' J1-#??!2955 '-6!@16- 'A2!#\$ 4 !6' (#- . !#0F\$1J\$/>!0?\$ 4 #61!#/ .!2926#\$/#E\$?\$6=!> '#?2!\$/! 4 '-1!
6-#/2\$6!5- 'K1062R!T '-!3/61-J\$1 (11!7!26#612^!

F1!; 7 7 B!0# 4 1!#861-!@1#29-12!Q!#/.!@X!6F1!; 7 7 B!-181-2!6'!@1#29-1!Q!#/.!@1#29-1! @!\$/!61-42!'8!\$62!?\$01!F1?5\$/>!92!6'!>16!6'!.10#-E'/\$D#6\$'/!>'#?2\$!!N96!@1#29-1!Q!#/.! @1#29-1!@!.'/q6!/10122#-\$?=!.1#?!(\$6F!6F1!; 7 7 B\R:36!F1?52!92!>16!6F'21!>'#?2!\\$/!4'-1! 6-#/2\\$6!5-'\K1062\X!(F\\$0F!-1.9012!C@\X!(F\\$0F!-1.9012!J1F\\$0?1!14\\$22\\$'/2!\\$/!"7!0'9/6=\R!\Y1!

"#\$!Gm

!

 $*F121! 4 1\#29-12!\#-1!5-'K1061.!6'!\#J'\$.!4'-1!6F\#6!P\%VXHHH!@*;, G1!\#//9\#??=R^{mH}!*F\$2!\$2!6F1! \\ 1]9\$J\#?1/6!'8!-14'J\$/>!4'-1!6F\#/!\setminus KHHH!5\#221/>1-!J1F\$0?12!8-'4!6F1!-'\#.!8'-!\#!=1\#-K! (F\$?1!\#?2'!5-'J\$.\$/>!/16!0'26!2\#J\$/>2!\#/.!1/J\$-'/41/6\#?!0'cE1/18\$62!?\$01!\$45-'J1.!\#\$-!]9\#?\$6=!\#/.!.-'9>F6!-12\$?$1/01R!$

T9-6F1-4'-1X!E'6F!3/61-J\$1 (11!; !#/.!3/61-J\$1 (11!) !F\$>F?\$>F61.!6F#6!; 77B!\$2!'/?=!'/1!5#-6!'8!
@ 16-'A2!2926#\$/#E\$?\$6=!188'-62!#/.!\$2!29E2941.!9/.1-!6F1!E-'#.1-!@16-'!<926#\$/#E\$?\$6=!B?#/X!
\$/.\$0#6\$/>!6F#6!6F121!; 77B!5'?\$0\$12!#-1!89-6F1-!E1\$/>!\$/61>-#61.!\$/6'!09--1/6!#/.!8969-1!
2926#\$/#E\$?\$6=!8-#41('-OR!T'-!\$/61-J\$1(11!)!26#612X!!

 $7 . . \$6\$' / \#??=X!@ 16-'A2!\%Hc=1\#-!2926\#\$/\#E\$?\$6=!26-\#61>\$0!5?\#/X!@'J\$/>!N1='/.!<926\#\$/\#E\$?\$6=! Z@N<[X!\$2!0'/2\$261/6! (\$6F!'9-!GH\%U!; 7 7 B!>'\#?2!'8!E10' 4 \$/>!0\#-E'/!/196-\#?!#/.!. $25?#0$/>! 'J1-!S\HXHHH!@ 16-$0!*'/2!'8!; #-E'/!) $'+$.1!C]9$J#?1/6!Z@*; ,G1[!E=!GHmHR!@N<!6#->162!-1?#61.!6'!1/1->=!#/.!26-#61>$12!-1?#61.!6'!1 4 22'/2!.$25?#01 4 1/6!'96?$/1!@ 16-'A2!188'-62!6' (#-.!#!.10#-E'/$D1.!8969-1R!$

^{mH}!C26\$4#61.!92\$/>! I <!CB7A2!Y-11/F'921!Y#2!C]9\$J#?1/0\$12!;#?09?#6'-!

! "#\$!GV

"#\$!G\

!

?#->1-!]9#/6%6=!'8!0#-2!'/!6F1!8-11 (#=2R!*F121!F\$>F (#=!1+5#/2\$'/!5-'K1062!\$/F1-1/6?=!0'/6-#.\$06!
26#61 4 1/62!'8!@16-'A2!>'#?2!'8! 4 'J\$/>!51'5?!!# (#=!8-'4!J1F\$0?!!921R!T'-!1+#45?!X!\$/!#/!#-6\$0?!!
#E'96!@16-'A2!5-'>-122!'/!6F1!3cm!n'-6F!; '9/6=!C/F#/01 4 1/6!B-'K106!6F#6! (\$.1/2!6F1!F\$>F (#=!(\$6F!#/'6F1-!&\$>F!,0095#/0=!o1F\$0?!!?#/1!Z&,o[X!"'2!7/>1?12!; '9/6=!<951-J\$2'-!#/.!@16-'!
N'#-.!@1 4 E1-!h#6F-=/!N#->1-!26#612^!

36!\$2!0-\$6\$0#?!6F#6! (1!1/29-1!6F1!2#81!#/ .!188\$0\$1/6! '51-#6\$ '/! '8!6F1!3cm\(F\)\$0F!\(F\)\$2!6F1! E#00E'/1! '8!0' 4 4 1-01!\(F\)\$1!\(H\)\$10!\(I\) \(F\)\$1!\(F\)\$12\(I\)\$1.\(F\)\$12\(I\)\$12\(I\)\$12\

) 1 4 ' /26-#61 . !6F- '9>F!6F\$2!-1?1#21 . !26#61 4 1 /6X!5 ' ?\$6\$0#?!#/ . !10 ' / ' 4 \$0!\$ 4 5 ?\$0#6\$ ' /2!8 ' -!6F1! \$/0?92\$ ' /! '8!- '# . !#/ . !F\$>F (#=!1+5#/2\$ ' /!5- 'K1062!#-1!F\$>F?\$>F61 . R!*F- '9>F '96!6F1!\$/61-J\$1 (2X! ! "#\$!GU

#00 ' 45 %2F! 4 '-1!0 ' 45-1F1/2\$J1!0% 4 #61!> '#?2R!*F\$2!\$/0-1#21! '8!\$/8-#26-9069-1!8 '-! 4 '-1!J ' ?9 4 1!

'8!J1F\$0?12!/1>#612!6F1!5 '61/6\$#?!8 '-!? ' (1-\$/>!Y&Y!1 4 \$22\$ '/2! (\$6F!59E%0!6-#/2\$6!\$/8-#26-9069-1R!!

@ 16-'!F#.!#! 4116\$/>!#E'96!6F1\$-!.\$881-1/6!26-#61>\$12!\$/0?9.1.!6F1!5-'K1061.!8''65-\$/6!'8! 1+5#/.\$/>!8-11 ($\#=2\mathbb{R}!T11.E\#00!6F\#6!6F1=!\#-1!6\#0\$/>!\$/6'!4\$/.\mathbb{R}!*F1!\$/0?92\$'/!'8!8-11$ ($\#=1.5\#/.\mathbb{R}!$ ($\#=1.5\#/.\mathbb{R}!$) $\#=1.5\#/.\mathbb{R}!$ ($\#=1.5\#/.\mathbb{R}!$) $\#=1.5\#/.\mathbb{R}!$) $\#=1.5\#/.\mathbb{R}!$ ($\#=1.5\#/.\mathbb{R}!$) $\#=1.5\#/.\mathbb{R}!$)

! "#\$!MH

'->#/\$D\$/>!#/.!.12\$>/\$/>!5-'K1062!#/.!\$62!'51-#6\$'/2!#/.!'861/!\$6!\$2!?186!95!6'!6F1!<926#\$/#E\$?\$6=!

#/.!C/J\$-'/41/6#?!;'45?\$#/01!.15#-641/6!6'!^2'?1?=a!592F!8'-!2926#\$/#E?1!5-'K1062!#/.!

\$/8-#26-9069-1!1J1/!(\$6F\$/!6F1!/1(1-!@1#29-1!@!5-'K1062R!@'-1'J1-X!(\$6F\$/!5-'K1062X!6F1-1!#-1!

2510\$8\$0#6\$'/2!6F#6!0'J1-!6F1!E#2\$0!-1]9\$-141/62!E96!#/=!#..\$66'/#?!>-11/!5-'K1062!51-6#\$/\$/>!6'!

89-6F1-!>-11/!2510\$8\$0#6\$'/2X!8'-!1+#45?1!0?\$4#61!#.#56#6\$'/!26-#61>\$12X!\$2!?186!95!6'!6F1!

<926#\$/#E\$?\$6=!.15#-641/6!6'!592F!8'-!#/.!8\$/.!6F1!89/.\$/>!8'-R!*F-'9>F!6F\$2X!4'26!'8!6F1!>'#?2!

8-'4!6F1!;77B!#-1!4#\$/61/#/01!#/.!'51-#6\$'/2!F1#J=!.91!6'!6F1!#E\$?\$6=!8'-!6F1!.15#-641/6!

(\$6F\$/!@16-'!6'!#069#??=!F#J1!#>1/0=!'J1-!.10\$2\$'/2!.91!6'!\$6!E1\$/>!@16-'!'(/1.!4#.1!

0'45#-1.!6'!0'/6-#062R!72!6F1!<926#\$/#E\$?\$6=!#/.!C/J\$-'/41/6#?!;'45?\$#/01!.15#-641/62!#-1!6F1!

4#K'-\$6=!#06\$J1?=!\$/J'?J1.!(\$6F!5?#//\$/>!8'-!2926#\$/#E?1!5-#06\$012!(\$6F\$/!@16-'!5-'K1062X!6F1-1!\$2!

/'!\$/F1-1/6!0-\$61-\$#!8'-!2926#\$/#E\$?\$6=!E1\$/>!89\$?6!\$/!(F1/!0-1#6\$/>!6F1!26-9069-#?!2=2614R!*F\$2!

21J1-1?=!-126-\$062!6F1!2926#\$/#E?1!188106\$J1/122X!188\$0\$1/0=X!#/.!0'45-1F1/2\$J1/122!(\$6F\$/!09--1/6!

#/.!8969-1!6-#/2\$6!5-'K1062!#2!2926#\$/#E?1!5-#06\$012!#-1!6F1/!#..1.!#2!#/!#..\$6\$'/!#/.!/'6!E1\$/>!

3/!'-.1-!6'!\$45-'J1!6F1!'J1-#??!188106\$J1/122!'8!@16-'A2!26-#61>\$12!#/.!'51-#6\$'/#?!5-'K1062!6'!
\$45?141/6!4'-1!#>>-122\$J1!#/.!0'45-1F1/2\$J1!.10#-E'/\$D#6\$'/!5'?\$0=!>'#?2!3!-10'441/.!6F1!
8'??'(\$/>^!

%R	B-\$'-\$6\$D1!5?#//\$/>!6F1!	\mathbf{P} R	@16-'!145F#2\$2!'/!	mR	@16-'!0#/!0-1#61!4'-1!
	8'9/.#6\$'/!'8!8969-1!		O-1#6\$'/!'8!2926#\$/#E?1!		59E%0!'96-1#0F!
	6-#/2\$6!5-'K1062!(\$6F!		K'E2!6'!#122!?#E'-!		0#45#\$>/2!6'!F1?5!
	2926#\$/#E\$?\$6=!#/.!		>-'952!145?'=41/6!		. 1J1? ' 5!09%9-#?!
	1/ J \$-'/41/6#?!		0'/01-/2!6F#6!.'12!/'6!		0'/20\$'92/122!#/.!5'?\$0=!
	0'45?\$#/01!4#/.#612!\$/!		2955'-6!1+5#/2\$'/!'8!		?\$61-#0=!!
	4\$/.!!		F\$>F (#=!\$/8-#26-9069-1!!		!
	!		!	VR	@16-'!0#/!F#J1!0?1#-1-!
					59E%0!6-#/25#-1/0=!#E'96!

! "#\$!M%

```
GR @ '-1!$/61-.15#-641/6#?!
O'??#E'-#6$'/!#/.!2955'-6!
8'-!6F1!$45?141/6#6$'/!'8!
26#/.#-.$D1.!
.10#-E'/$D#6$'/!#/.!
2926#$/#E$?$6=!5-#06$012!$/!
5-'K1062!
!

MR ; '/6-#062!F#J1!
5-1.161-4$/1.!#/.!
26#/.#-.$D1.!-1]9$-141/62!
}!2510$8$0#6$'/2!8'-!
4#61-$#?2!#/.!E9$?.$/>!
5-#06$012!
```

*E! _1('#\$*54&\%

3/!'-.1-!6'!-1#?\$26\$0#??=!0' 4 E#6!0?\$ 4 #61!0F#/>1! (\$6F!8969-1!6-#/2\$6!5-'K1062X!26#/.#-.\$D1.! 2926#\$/#E?1!#/.!.10#-E'/\$D#6\$'/!J#?912!#-1!J\$6#?!(\$6F\$/!\$/61-.15#-641/6#?!0''51-#6\$'/\$!3/261#.!'8! -1?=\$/>!'/!'/?=!#!81(!.15#-641/62!6'!4#/#>1!>-11/!'51-#6\$'/2!#/.!>9\$.1?\$/12!8'-!6-#/2\$6!5-'K1062X! @ 16-'!4926!26#-6!6F1!8'9/.#6\$'/2!'8!5-'K1062!(\$6F!2926#\$/#E?1!26#/.#-.2X!5-#06\$012X!#/.!'51-#6\$'/2! #6!6F1!8'-18-'/6!'8!5?#//\$/>! (\$6F\$/!#??!26#>12!'8!6F1!.1J1?'541/68!)'\$/>!2'!('9?.!\$45?141/6! 4 '-1!0 ' 45-1F1/2\$J1!#/.!188106\$J1!0?\$ 4 #61!5 ' ?\$0\$12!#/.!.10#-E ' /\$D#6\$ ' /!> ' #?2!\$8!#??!.15#-641/62! F#.!>-11/!2510\\$8\0#6\\$'/2!#/.!-1]9\\$-141/62!E9\\$?6!\\$/!#6!1J1-=!26\#>1!'\8!6-\#/2\\$6!.1J1?'\541/6\\$! 72!6F1!>,*6#\$(%?2\$*54%#4.%?.#1\$#\$*54%@,#4!145F#2\$D12!.10#-E'/\$D#6\$'/!'8!@16-'!0'/6-'??1.! '51-#6\$'/2!(\$6F\$/!6-#/2\$6!5-'K1062X!@16-'!4926!#..\$6\$'/#??=!#\$4!6'!0-1#61!4'-1!#221-6\$J1!>-11/! 26#/.#-.2!8'-!'51-#6\$'/2X!1]9\$541/6X!#/.!5-'K106!0'/26-906\$'/!(\$6F!6F1\$-!0'/6-#06'-2R!;9--1/6?=X! @16-'!F#2!-10'/26-906\$'/!6F-'9>F!5'?\$0=X!(F\$0F!-1]9\$-12!0'/6-#06'-2!6'!E-\$/>!\$/!2510\$8\$0!0\$/.2!'8! 1]9\$5 4 1 / 6!; ' / 6-#06' - 2!#-1! / '6!#??' (1 . !6' !E-\$/>!\$ / !1]9\$5 4 1 / 6!9 / . 1 - !#!01 - 6#\$ / !6\$1 - !E#21 . ! '88! 21J1-#?!?# (2!E96!.91!6'!;, o3)!2F'-6#>12!#/.!\$/#E\$?\$6=!6'!0F#/>1!09--1/6!179\$541/6!#/.! 4#61-\$#?2\!1+1456\\'/2!.151/.\\$/>!'/!6F1!5-'\K106!#-1!4#.1\R!7?6F\'9>F!6F\\2!\\2!\#!5-'\4\\2\\/>!26#-6\\!8\'-! 1J1/69#??=!6F1!89??!26#/.#-.\$D#6\$'/!'8!-1]9\$-141/62!8'-!4#61-\$#?2!#/.!'51-#6\$'/2\!4'-1!-1>9?#61.!

! "#\$!MG

-9?12!#/.!#!26-#61>=!6'!2'9-01!#/.!59-0F#21!01-6#\$/!2955?\$12!/11.!6'!E1!145?'=1.!#2!@16-'!#\$42!
6'!4'J1!6'(#-.!4'-1!#221-6\$J1!0?\$4#61!>'#?2!#/.!2926#\$/#E\$?\$6=!5-#06\$012\!!

**E! @5,*20\\53\\Y+&\\$\#*4\#/,(\\P5/\\>'(\#\\$*54\\)

, /1!'8!6F1!4#\$/!0-\$6\$]912!'8!6F1!26-#61>\$12!145?'=1.!E=!@16-'!(#2!6F1!\$/0?92\$'/!'8!F\$>F(#=!1+5#/2\$'/!5-'K1062!.91!6'!5'?\$6\$0#?!#/.!10'/'4\$0!0'/0122\$'/2R!72!6F1!F\$>F(#=!1+5#/2\$'/!5-'K1062!.91!6'!5'?\$6\$0#?!#/.!10'/'4\$0!0'/0122\$'/2R!72!6F1!F\$>F(#=!1+5#/2\$'/!5-'K1062!(1-1!\$/0?9.1.!5#-6?=!.91!6'!\$62!5'61/6\$#?!8'-!K'E!0-1#6\$'/!'J1-!=1#-2X!@16-'!/11.2!6'!145F#2\$D1!6F1!0-1#6\$'/!'8!2926#\$/#E?1!K'E2!(\$6F!#!>''.!(#>1!#/.!E1/18\$62!6'!#..-122!?#E'-!>-'952!145?'=41/6!0'/01-/2!\$/!#!(#=!6F#6!.'12!/'6!2955'-6!6F1!1+5#/2\$'/!'8!F\$>F(#=2!(\$6F\$/!"7R!!79-6F1-4'-1X!6F1!>??@X!@1#29-1!QX!#/.!@1#29-1!@!0'/6#\$/2!5'?\$0\$12!#/.!5-'K1062!6F#6!#.J'0#61!8'-!6F1!4'.#?!2F\$86!'8!2\$/>?1!921!J1F\$0?12!6'!59E?\$0!6-#/2\$6R!*'!#00'45?\$2F!6F\$2X!6F1-1!/11.2!6'!E1!#!2\$49?6#/1'92!188'-6!6'!.1J1?'5!K'E2!6'!2955'-6!6F\$2!#.J#/0\$/>!#/.!6'!.10-1#21!6F1!/11.18'-!F\$>F(#=!5-'K1062R!!

, /1!'8!6F1!01=!\$22912!1/0'9/61-1.!(#2!6F1!?#00!'8!59E?\$0!#(#-1/122!#/.!#J#\$?#E?1!

\$/8'-4#6\$'/!\$/6'!@16-'A2!5-'K1062X!.15#-641/62X!'->#/\$D#6\$'/X!#/.!.#6#R!7..\$6\$'/#??=X!6F1-1!0'9?.!

5'61/6\$#??=!E1!#!>#5!\$/!51'5?1A2!#E\$?\$6=!6'!/#J\$>#61!@16-'A2!(1E2\$61!#/.!9/.1-26#/.!6F1!-F16'-\$0!

#/.!.'0941/62!5-121/61.R!I/?122!'/!!(#2!.\$-106?=!5'\$/61.!6'(#-.!#!2510\$8\$0!?\$/0!'-!.'0941/6X!\$6!

(#2!0F#??1/>\$/>!6'!8\$/.!51-6\$/1/6!\$/8'-4#6\$'/R!@#K'-\$6=!'8!6F1!?\$/02!6F#6!0'/6#\$/1.!59E?\$0!

\$/8'-4#6\$'/!#E'96!5-'K1062!(1-1!'/!6F1!'88\$0\$#?!(1E2\$61!=16!.\$.!/'6!('-OR!38!'/1!#\$41.!6'!0'/6#06!

#!2510\$8\$0!.15#-641/6!#6!@16-'X!6F1-1!(#2!/'!-10'-.2!'8!(F'!2510\$8\$0#??=!(#2!\$/!6F1!.15#-641/6!

'-!\$/!0F#->1!'8!(F\$0F!5-'K1062R!38!'/1!#\$41.!6'!>'!5F=2\$0#??=!\$/6'!6F1!@16-'!?\$E-#-=!6'!#0]9\$-1!

.#6#X!6F1!?'0#6\$'/!(#2!5F=2\$0#??=!0?'21.R!!7..\$6\$'/#??=X!#661456\$/>!6'!251#0!(\$6F!#!@16-'!#>1/0=!

! "#\$!MM

4 1 4 E1-!8-' 4!. 15#-6 4 1/62X!?\$01!<926#\$/#E\$?\$6=X!6' 'O! 4 9?6\$5?1!6-\$12R!*F1!2F11-!/9 4 E1-!'8!

. '09 4 1/62!#/.!J'?9 4 1!'8!610F/\$0#?!?#=1-2! (\$6F\$/!6-=\$/>!6'!#00122!\$/8'-4#6\$'/!#/.!

0' 4 4 9/\$0#6\$'/!F\$>F?\$>F62!6F1!/11.!8'-!@16-'!6'!0'/2'?\$.#61!#/.!6-#/28'-4!6F1\$-! (1E2\$61! (\$6F!
#00122\$E?1X!-1?1J#/6X!#009-#61X!#/.! ('-0\$/>!?\$/02!6F#6!5-'4'612!.#6#!#/.!0'449/\$0#6\$'/!

6-#/25#-1/0=R!W\$6F'96!6F\$2!?1J1?!'8!6-#/25#-1/0=X!\$6!4#012!\$6!1+6-141?=!.\$88\$09?6!8'-!@16-'!6'!E1!

F1?.!#00'9/6#E?1!#/.!E1!0'45-1F1/2\$E?1!6'!\$62!0\$6\$D1/2R!!

! "#\$!MP

6F#6!@16-'!96\$?\$D12!6' (#-.2!5'?\$0=!>'#?2!'8!.10#-E'/\$D#6\$'/!0#/!E1!E10'41!89-6F1-!
0'45-1F1/2\$E?1R!!

T'9/.!(\$6F\$/!\$/61-J\$1(2!(\$6F!@16-'!414E1-2X!6F1!4#\$/!26-#61>=!'8!E9\$?.\$/>!'96!6-#/2\$6!

\$/8-#26-9069-1X!6F#6!(#2!89/.1.!E=!@1#29-1!Q!#/.!2510\$8\$0#??=!@1#29-1!@X!(#2!\$.1/6\$8\$1.R!

7..\$6\$'/#??=X!(\$6F\$/!6F121!6-#/2\$6!5-'K1062X!@16-'!F#2!\$45?141/61.!#/.!#.'561.!6F1!GH%U!; 77BR!

7!5?#/!(F\$0F!\$2!8'0921.!6'!145F#2\$D1!6F1!.10#-E'/\$D#6\$'/!'8!'51-#6\$'/2!\$/!6-#/2\$6!5-'K1062R!WF\$?1!

6F121!'51-#6\$'/#?!5'?\$0\$12!#-1!.1141.!E1/18\$0\$#?X!6F1!?#->1-!0'/0156!'8!E9\$?.\$/>!6-#/2\$6!

\$/8-#26-9069-1!6'!0'4E#6!Y&Y!14\$22\$'/2!6F-'9>F!4'.#?!2F\$86!0#/!E1!4'-1!0'45-1F1/2\$J1R!*'!

4#01!E9\$?.\$/>!59E?\$0!6-#/2\$6!\$/8-#26-9069-1!#2!#.J#/6#>1'92!#2!\$6!0'9?.!5'22\$E?=!E1X!@16-'!/11.2!

6'!#..-122!6F1!5'?\$6\$0#?!#/.!10'/'4\$0!0'/012212(\$)0.2(J1)0.2(R!*)0.2('!)]TJETQq0.24TQq0.(0)0.2(!(2)

! "#\$!MV

&91-6#X!; ?#9.\$#!BR!`*-#/2\$6!T9/.\$/>!x!WF=!6F1!B'?\$6\$02:!7!; '45#-#6\$J1!<69.=!'8!B9E?\$0! *-#/25'-6#6\$'/!3/8-#26-9069-1!T9/.\$/>!\$/!n1(!i'-0!;\$6=!#/.!"'2!7/>1?12ka!*F12\$2X! ;,"I@N37!In3oCQ<3*iX!GH%GR!!

 $\&=4 '/X! < 61J1X! `@16-'!Q16\$-12!"#26!) \$121?!N92X!N10 '412!W'-?. $_2!T\$-26!@\#K'-!*-\#/2\$6!7 > 1/0=!6'! , 51-\#61! , /?=! ; ?1\#/!T91?!N9212Ra!*F1! < '9-01X!j\#/9\#-=!\%GX!GH\%R! F6652\bb6F12 '9-01R4 16-'R/16\bGH\%bH\%b\Gb4 16-'c-16\$-12c\$#26c . $121\cE92cE10 '412c ('-?.2c8\$-26c 4\#K'-c6-\$/2\$6c\$>1/0=c6'c'51-\$61c'/?=c0\?1\$/c891\cE9212\$R!!$

! "#\$!MS

"\$/6'/X!j'1X!#/.!)#4\$1/!n1(6'/R!`3/61-J\$1(!(\$6F!@\$0F#1?!<0F/1\$.1-X!T'9/.1-!'8!<6-1162!8'-!7??Ra!<6-1162E?'>!"'2!7/>1?12X!n'J14E1-!SX!GH%UR!F6652^bb?#R26-1162E?'>R'->bGH%Ub%%bHSb\$/61-J\$1(c(\$6Fc4\$0F#1?c20F/1\$.1-c8'9/.1-c'8c26-1162c8'-c#??bR!!

- " '2!7 />1?12!; '9/6=!@16-'5'%6#/!*-#/25'-6#6\$'/!796F'-\$6=R!Q15R!7(\$'5\\N+4.\dagge*4)\\Y5+'2(&\\V+\dagge*.(\lambda)\\V+\dagge*.(\lambda)\\V+\dagge*.(\lambda)\\V+\dagge*.(\lambda)\\V+\dagge*.(\lambda)\\V+\dagge*.(\lambda)\\V+\dagge*.(\lambda)\\V+\dagge*.(\lambda)\\V+\dagge*.(\lambda)\\V+\dagge*.(\lambda)\\V+\dagge*.(\lambda)\\V+\dagge*.(\lambda)\\V+\dagge*.(\lambda)\\V+\dagge*.(\lambda)\\V+\dagge*.(\lambda)\\V+\dagge*.(\lambda)\\V+\dagge*.(\lambda)\\V+\dagge*.(\lambda)\\V+\dagge*.(\lambda)\\V+\dagge*.(\lambda)\\V+\dagge*.(\lambda)\\V+\dagge*.(\lambda)\\V+\dagge*.(\lambda)\\V+\dagge*.(\lambda)\\V+\dagge*.(\lambda)\\V+\dagge*.(\lambda)\\V+\dagge*.(\lambda)\\V+\dagge*.(\lambda)\\V+\dagge*.(\lambda)\\V+\dagge*.(\lambda)\\V+\dagge*.(\lambda)\\V+\dagge*.(\lambda)\\V+\dagge*.(\lambda)\\V+\dagge*.(\lambda)\\V+\dagge*.(\lambda)\\V+\dagge*.(\lambda)\\V+\dagge*.(\lambda)\\V+\dagge*.(\lambda)\\V+\dagge*.(\lambda)\\V+\dagge*.(\lambda)\\V+\dagge*.(\lambda)\\V+\dagge*.(\lambda)\\V+\dagge*.(\lambda)\\V+\dagge*.(\lambda)\\V+\dagge*.(\lambda)\\V+\dagge*.(\lambda)\\V+\dagge*.(\lambda)\\V+\dagge*.(\lambda)\\V+\dagge*.(\lambda)\\V+\dagge*.(\lambda)\\V+\dagge*.(\lambda)\\V+\dagge*.(\lambda)\\V+\dagge*.(\lambda)\\V+\dagge*.(\lambda)\\V+\dagge*.(\lambda)\\V+\dagge*.(\lambda)\\V+\dagge*.(\lambda)\\V+\dagge*.(\lambda)\\V+\dagge*.(\lambda)\\V+\dagge*.(\lambda)\\V+\dagge*.(\lambda)\\V+\dagge*.(\lambda)\\V+\dagge*.(\lambda)\\V+\dagge*.(\lambda)\\V+\dagge*.(\lambda)\\V+\dagge*.(\lambda)\\V+\dagge*.(\lambda)\\V+\dagge*.(\lambda)\\V+\dagge*.(\lambda)\\V+\dagge*.(\lambda)\\V+\dagge*.(\lambda)\\V+\dagge*.(\lambda)\\V+\dagge*.(\lambda)\\V+\dagge*.(\lambda)\\V+\dagge*.(\lambda)\\V+\dagge*.(\lambda)\\V+\dagge*.(\lambda)\\V+\dagge*.(\lambda)\\V+\dagge*.(\lambda)\\V+\dagge*.(\lambda)\\V+\dagge*.(\lambda)\\V+\dagge*.(\lambda)\\V+\dagge*.(\lambda)\\V+\dagge*.(\lambda)\\V+\dagge*.(\lambda)\\V+\dagge*.(\lambda)\\V+\dagge*.(\lambda)\\V+\dagge*.(\lambda)\\V+\dagge*.(\lambda)\\V+\dagge*.(\lambda)\\V+\dagge*.(\lambda)\\V+\dagge*.(\lambda)\\V+\dagge*.(\lambda
- `@1#29-1!@Ra!Q1E9\$?.<';#?X!<15614E1-!GGX!GHGHR!F6652^bb-1E9\$?.2'0#?R'->b\$/\$6\$#6\$J12b41#29-1c 4bd^e^61+6fW\$6FgGH6F1gGH2955'-6gGH'8gGH/1#-?=X216gGH6'gGH1+5\$-1gGH\$/gGHGHMUR!!
- @ 16- 'X!" 7 R!` @ 16- '!N-1#02!Y-'9/.!'/!3cm! n '-6F!; '9/6=!C/F#/01 4 1/62!B- 'K10@a!*F1!<'9-01X!
) 101 4 E1-!GX!GHG%R!F6652^bb6F12'9-01R 4 16- 'R/16bGHG%b%GbH%b 4 16- 'cE-1#02c>- '9/.c'/c\$cmc
 / '-6Fc0'9/6=c1/F#/01 4 1/62c5- 'K106bR!!
- @ 16- 'R!` 7 E '96!@ 16- '!7-0F\$J1Ra!" 7!@ 16- 'R!@ 16- 'X!GHGGR!F6652^bb (((R 4 16- 'R/16b#E '96bR!!
- `@16-'!T9/.\$/>!<'9-012!Y9\$.1!GHGHa!Z"'2!7/>1?12!; '9/6=!@16-'5'?\$6#/!*-#/25'-6#6\$'/!
 796F'-\$6=X!@#=!GHG%[X!F665^bb41.\$#R416-'R/16bGHGHb@16-'cT9/.\$/>c<'9-012cY9\$.1c
 GHGHR5.8R!
- @ 16-'R!`@ 1#29-1!Q!#/.!6F1!T\$/#/0\$/>!B?#/Ra!@ 1#29-1!Q!, J1-J\$1 (!c!@9/0!<0F''?!'8!Y?'E#?! 788#\$-2R!"'2!7/>1?12!; '9/6=!@ 16-'5'?\$6#/!*-#/25'-6#6\$'/!796F'-\$6=R!7001221.!@#-0F!MHX! GHGGR! F6652^bb 49/020F''?R96'-'/6'R0#b\$ 48>b95?'#.2b%U%b 41#29-1r-r'J1-J\$1 (r5-121/6#6\$'/r4#-0 FrGH%GrO#6DrGR5.8R!!
- @'J1!"7R!`7E'96! I 2^!@'J1!"7Ra!@'J1!"7R!7001221.!@#-0F!GUX!GHGGR!
 F6652^bb(((R4'J1?#R'->b#E'96r92d^e^61+6f@1#29-1gGHQgGH(#2gGH#gGHMHXGMVgGH4\$?
 12gGH#/.gGHGHHgGH26#6\$'/2R!!
- $\begin{array}{l} n\ 1\ (\ 6'\ /\ X!\)\ \#\ 4\ 1\ /\ X!\#\ /\ .!\ j\ '\ 1!"\ \$/6'\ /\ R!\ @\ 16-'\ !\ N'\#-.\ ^!"\ 16!6F1!B1'\ 5?1!\ o\ '61!'\ /\ !C+61/.\ \$/>!<\#?12!*\#+\ Ra! \\ <6-1162E?'>\ !''\ '2!\ 7\ />1?12X!\ j\ 9\ /\ !\ !G\ N'\ GR!\ F6652\ ^b\ !\#R26-1162E?'>\ R'->\ bGH\ GbH\ VbG\ b\ 4\ 16-'cE'\#-.c \\ ?16c6F1c51'\ 5?1c\ J'\ 61c'\ /\ c1+61/.\ \$/>c2\#?12c6\#+bR!! \\ \end{array}$

! "#\$!M\

$$\begin{split} I \ EE1?2 \& !N\#-=& \& |\#/. \ !B161-! \ n \& \# 45 \& | \ I/0'/J1/6 \& /\#?! \ T9/. \& />! \ '8! \ I-E\#/! \ B9E? \& !*-\#/25'-6 \& !C22 \#= \& ! \ 3/! \ F'\#4 \& 15' \& \# 54 \& (\& (\#'2'' \& \#' \& M0 \& F' \#4 \& 15' \& \#4. \& Z4T*'546 (4 \& !S \& !m6F!1. \& X!S^M \& S GUR! \ 7 \ 4261-. \#4 \& !n \ 16F1-? \#/. 2^!) \ 15\#-64 \ 1/6! \ '8! \ Q1> \& '/#?! \ C0'/'4 \& 02 \& !T-11! \ I/ \& J1-2 \& = \& !GHHG \& !! \ . \end{split}$$

 $W\#=N\#00!@\#0F\$/1R!^T\#062!76!\#!Y?\#/01Ra!W\#=E\#00!@\#0F\$/1^!3/61-/16!7-0F\$J1X!n'J14E1-!\%\X!GH\%VR!F6652^bb (1ER\#-0F\$J1R'->b(1EbGH\%V\%GGmH\WumPbF6652^bb) ((R416-'R/16b/1(2b8\#062c)?\#/01bR!!)$

! ! ! "#\$!MU

!
a+(&\$*544#*'(0))

3/61-J\$1 (!_9126\$'/2!8'-!7>1/0=!@14E1-2^!

- %R &'(!('9?.!='9!.120-\$E1!='9-!-'?1!(\$6F\$/!6F1!#>1/0=:!!
- GR WF#6!.15#-641/6! (\$6F\$/!6F1!#>1/0=!.'!='9!('-0!\$/:!&'(!?'/>!F#J1!='9!('-01.!(\$6F\$/!6F1!#>1/0=:!
- MR WF#6!\$2!='9-!8#4\$?\$#-\$6=!(\$6F!6F1!:;<=%>,*6#\$(%?2\$*54\\\#4.\\?.\\#1\$*54\\\@,\\\#4\\\A>??\@B\\\5'?\\$0=!
- PR &'(!\$2!@16-'!#\$4\$/>!6'(#-.!>'#?2!'8!.10#-E'/\$D#6\$'/!E#21.!'88!6F121!;77B!5'?\$0\$12:!
- mR WF#6!\$2!='9-!8#4\$?\$#-\$6=!(\$6F!@1#29-1!Q!#/.!@1#29-1!@:!

VR

! "#\$!PH

!

3/61-J\$1(!_9126\$'/2!8'-!7.J'0#0=!Y-'952^!

%R