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

Q\$ 2MMD=78@1!A7; D!1<GG9L9D8@?!1A# [8!@A7@@AD!6DM7B@ED8@X1!BDMBD1D8@7@#8! 00\$ X=798@GGIRI: DGD81D!#G!@AD!: 91@B9L@L#<B@RI!B<=98C!#8!MDBE9119; D! 000\$ QG!@AD!/#<B@!7GG9BE14!2MMD=78@!BDIMDL@G<=?!BDc<DI@!7La8#[=D:CED8@! @A7d.@AD?!L78!7C798!IDDa!98@DB; D8@#8!IA#<=: !@AD!6DM7B@ED8dLA78CD! $\mathsf{L}\# < \mathsf{BID}$ $1.8 \pm 1.8 \pm 1.0 \pm 1.0$ /DB@G9L7@I#G!/#EM=978LD!ļ

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G%;,74134 * 7# ##4!!

]Z*!P$Z:!*]!^(I@/\mathred{\text{98}}!\&\((_\text{state})\) (\[ \]

G\mathred{\text{84}},.4\N6>",#74507+\text{31345}#\mathred{\text{80}}\) (\[ \]

] !P\mathred{\text{85}}:!(*(!^(I@/\mathred{\text{98}}!(`+\mathred{\text{state}})\]

A#")/#7447\mathred{\text{807}},(@\mathred{\text{98}})\]

A#")/#747\mathred{\text{807}},(@\mathred{\text{98}})\]

EXTIRED{\text{80}}:!Y]\mathred{\text{98}}!\mathred{\text{8}}\]

EXTIRED{\text{80}}:Y\mathred{\text{98}}!\mathred{\text{8}}\]

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EXTIRED{\text{97}}:\mathred{\text{9}}:\mathred{\text{98}}!\mathred{\text{9}}:\mathred{\text{9}}\mathred{\text{804}}-\,\dathred{\text{10}}(\text{97};\dathred{\text{9}}:\dathred{\text{9}}\mathred{\text{9}}\mathred{\text{804}}-\,\dathred{\text{10}}(\text{97};\dathred{\text{9}}:\dathred{\text{9}}\mathred{\text{9}}\mathred{\text{10}}\mathred{\text{9}}\mathred{\text{9}}\mathred{\text{10}}\mathred{\text{9}}\mathred{\text{9}}\mathred{\text{10}}\mathred{\text{9}}\mathred{\text{9}}\mathred{\text{10}}\mathred{\text{9}}\mathred{\text{9}}\mathred{\text{10}}\mathred{\text{9}}\mathred{\text{9}}\mathred{\text{10}}\mathred{\text{9}}\mathred{\text{9}}\mathred{\text{9}}\mathred{\text{10}}\mathred{\text{9}}\mathred{\text{9}}\mathred{\text{10}}\mathred{\text{9}}\mathred{\text{9}}\mathred{\text{10}}\mathred{\text{10}}\mathred{\text{9}}\mathred{\text{10}}\mathred{\text{10}}\mathred{\text{10}}\mathred{\text{10}}\mathred{\text{10}}\mathred{\text{10}}\mathred{\text{10}}\mathred{\text{10}}\mathred{\text{10}}\mathred{\text{10}}\mathred{\text{10}}\mathred{\text{10}}\mathred{\text{10}}\mathred{\text{10}}\mathred{\text{10}}\mathred{\text{10}}\mathred{\text{10}}\mathred{\text{10}}\mathred{\text{10}}\mathred{\text{10}}\mathred{\text{10}}\mathred{\text{10}}\mathred{\text{10}}\mathred{\text{10}}\mathred{\text{10}}\mathred{\text{10}}\mathred{\text{10}}\mathred{\text{10}}\mathred{\text{10}}\mathred{\text{10}}\mathred{\text{10}}\mathred{\text{10}}\mathred{\text{10}}\mathred{\text{10}}\m
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bAD!: 91&9L@L#<B@I<EF7B9=?!: D89D: ! 2MMD=78@R! E#@#8!@#!98@DB; D8D4!#GGDB98C!

E989E7=!BD7I#898C!78: ![9\text{9}A#<@AD7B98C!GB#E!78?!#G!@AD!DF9I@8C!M7B@DI\$!X=798@GGI!8#[!

&?!@#!>7LaG9=!@AD!: 91&9L@L#<B@RI!: DL9I9#8I![9\text{9}A!BD7I#898C!\text{9}A7@9I8R@\text{9}ADBD!78: !7BC<ED8@!

@A7@\text{AD?!: 9: 8R@E7aD\$!K<@X=798@GGIR!BD@\text{BD}@\text{HMDL@}; D!: DGD8ID!: #DI!8#@L<BD!\text{AD!I<>\1@78@; D!

#B! MB#LD: <B7=! IA#B@L#E98CI! #G! \text{\text{QAD!}: DL9I9#8! >D=#[\$! bA9I! /#<B@ IA#<=: !; 7L7@! 78: !

BDE78: \$!!!

21!78@L9M7@: 4!(,,4KB\$!%Y'%]4!X=798@GG!!: #!8#@7BC<D!@A7@2MMD=78@R!E#@#8![71!
<8@ED=?!#B!@A7@2MMD=78@!=7La!7!L#C89h7>=D!98@DBDI@A7@E7?4!71!7!MB7L@L7=!E7@@DB4!>D!
7GGDL@: !>?!@A9!!=\$@C7@#8\$!bAD?!: DGD8: !#8=?!

X=798@GGIR! L#8@578?! 7BC<ED8@! >D@57?! 7! E9IC<9: D:! 7MMB#7LA! @#! @AD! _9>DB7=!
98@DB; D8@#8!B<=D1\$! bA91! /#<B@ A71!=#8C! I@D1ID: !@A7@98@DB; D8@#8!j BDC<9BD1!7!A#=9I@L4!
B7@ADB!@A78!BD: <L@#89I@!7MMB#7LA4k!! 6J3/?,713/503/0'4N3F3/13/! #&~4! (Z]!P\$Z:!(`)4!%&*!
^(I@ /98\$!(``+_4!E78: 7@8C!L=#ID!7@D8@#8!@#!j @AD!G7L@!#G!@AD!IMDL999L!L7ID4k! /#\$%,413/
- \$73@G3?3/8\$(<4M4A\$". "\$',4?,713/!%]%!P\$Z:!(Z4!(*!^(I@/98\$!%&&(_4!78:!j @AD!91I<D1!7@I@7aD!
98!@AD!M7B@L<=78!-\$9C7@#84k!! #&~4!(Z]!P\$Z:!7@%&+\$4/B9@L7=?4!j I>mDL7<ID!IE7=!: %GDBD8LD1!
98!G7L@M7@DB81!L78!!9C8%9L78@?!7GGDL@AD!#<@L#ED4!@AD!; DB?!87@<BD!#G!718!98@DB; D8@#8m!
98C<98?!-\$E9@!@AD!<@\$-\$9!#G!L#EM7B9I#81!>D@[DD8!78:!7E#8C!M<>-\$9IAD:!#M98#81\$k!9.3/7@
%&*3! 28:! D; D8! [AD8! IMD7a98C! #G! 7! j MBDI<EM@#8k! #G! 7: DC<7L?4! @AD! /#<B@ A7!!
DEMA719hD:!@AD!j:78CDB!98!7!EDLA789I@L!7MM-\$L7@#8!#G!!<LA!=78C<7CD\$k!/#\$%,4%]%!P\$Z:!
7@(`\$!

J #BID4! X=798@GG1!: 91711DE>=D! 2MMD=78@R! A#=91@L! L71D! G#B! 98@B; D8@#84! @AD8!
7BC<D! @A7@ D7LA! 7B@G9L97=?! 91#=7@D:! D=DED8@! 1@78: 98C! 7=#8D4! j:#D1! 8#@ D1@7>=91A!

987: Dc<7L?\$k! ?,, @ ,3;34 X=G1\$'KB\$! (`44%)4! Z(\$! X=798@GG1! [#<=:!BD:<LD! @A91! /#<B@R1! MBDLD: D8@!^[A9LA!I@BD11!@AD!G=DF9>=D4!L#8@DF@: DMD8: D8@87@<BD!#G!D7LA!: DL919#8_!@#!7! I?I@DE!#G!7='#B'8#@A98C4![##:D8=?!EDLA789L7=!B<=D1\$!-7@ADB!@A78!A#=91@L7=?![D9CA98C! @AD!G7L@!71!7![A#=D4!X=798@GG1!A7>9@<7=?!711<ED!@A7@7!C9; D8!G7L@E<I@D9@ADB!j D1@7>=91Ak! 987: Dc<7L?4!X=G1\$'KB\$! (`4!%)4!Z(4!#B!D=ID!E<I@8#@jE7@DB4k!X=G1\$'KB\$!%Y0!(,,4#"(0@,3;34!X=G1\$'KB\$!%Y0!(,,4#"(0@,3;34!X=G1\$'KB\$!%Y0!)

X=798@GGIRIB9C9: ! C#7=IgE#@; 7@#8!: 9LA#@#E?! G98: I!8#! I<MM#B@ 98! @A9!! /#<B@RI!
: DL919#81!D9ADB\$!?,,4X=GI\$'KB\$!%+'%`\$!bA#ID!L7ID!!19EM=?!BDL#C89hD!@A7@78!98@B; D8#BRI!
j E#BD! IMDL97=9hD: !98@BDI@k!: #DI!8#@ E78: 7@498@B; D8@#8! [AD8!@AD!DF9I@8C!M7B@DI!
[#<=: !E7aD!DF7L@?!@AD!17ED!7BC<ED8@!4!G%\$,.4N6>",#74507+31345#%0%4!]`]!P\$%: !(*(4!
(**!^(I@/%\$!(`+%_0!(,,4#"(04-#;;,&M!())%!P\$Z:!7@((%!^BDiDL@8C!71![A#=?!IMDL<=7@); D!@AD!
GD7B!@A7@@AD!C#; DB8ED8@[#<=: !8DC=DL@E#; 78@R!MB#M#ID: !7BC<ED8@_4!#B!^[#BID!?D@!
[AD8!@AD!98@B; D8#BR!17BC<ED8@[#<=: !7L@<7=?!j [#Ba!7C798I@@AD!C#7=@AD?!MB#GDII!@#!
IA7BD4k!?&6.,%&(4'0748#\$74*.B\$((\$0%(4134!7,(\$.,%&41M48,""0E(40'4F#71#7.450"34!+&)!P\$Z:!*)%4!
*)]!^(I@/98\$!%&(Y_\$!3<LA!: DL919#81!: #!8#@IMD7a!@#!@AD!19@<7@#8!ADBD4![ADBD!9@91!
<8: 9IM<@): !@A7@@AD!6DM7B@ED8@[9=!8#@B79ID!2MMD=78@RIL#8I@@@#87=!@AD#B9D14!(,,4;,%,7#""K46#L\$!`]!^E7a98C!8#!I<LA!L#8I@@@#87=!PSC<ED8@_0!6#L\$!(**!^17ED_4!78:!@ADBD!91!8#!7BC<ED8@_A7@2MMD=78@RIL#8I@@@#87=!PSC-ED8@_0!6#L\$!(**!^17ED_4!78:!@ADBD!91!8#!7BC<ED8@_A7@2MMD=78@RI@AD#B9D1![#<=: !G7;#B!X=798@GGI\$!

 7: DC<7L?4! [ADBD!MB9; 7@D!M7B@?!I#<CA@!7!i<: CED8@!#8!@AD!EDB9@!!78: !@AD!C#; DB8 ED8@!# 7CD8L?!j [#<=: !7LLDM@!7!MB#LD: <B7=!; 9L@#B?k_\$!!

X=798@GGI!: #!8#@!ED7898CG<=?!D8C7CD![9@A!@A9I!7BC<ED8@!17;D!@#!711DB@!@A7@9@! [#<=:!jD8@@Dlmk!j7=!98@DBDI@D:!@A9B:!M7B@DI!E7a98C!7=@DB87@;D!7BC<ED8@lk!@#! 98@DB; D8D\$!X=@1\$'KB\$!%Y\$!K<@!!98!#""!L71D14! [AD@ADB!7!M7B@?! [9@A!78!7=@DB87@); D!7BC<ED8@! E7?!98@B; D8D!91!7!L#8@DF@': DMD8: D8@98C<98?!@A7@!E<I@@88!#84!7E#8C!#@ADB!@A98CI4! @AD!87@BD!#G!@AD!L71D4!@AD!87@BD!#G!@AD!MB#M#1D: !98@B; D8#BR1!98@DBD1@1!98!@AD!L71D4!78: ! A#[!@AD!7BC<ED8@BD=7@D!!@#!@AD!9H<DI!78:!@#!@AD!M7B@DIR!98@DBDI@\$!?,,49%&"4!#+,745034! ++)!P\$%:!7@ ***'*Y!^c<#@8C! N6,((,41345#B+4!Z+Y!P\$%:!]`*4!)&%!^6\$/\$!/9\$\$!(`])_4!@#! 9=< |@7@0!|<LA!7!L#8@0F@<7=!98c<98? 0!(,,4#"(04-#;;,&&4!()%!P\$Z:!7@((Z!^8#@98C!@A7@;)@0|@! #G!p987: Dc<7L?R!@D8:!#!;7B?!: DMD8: 98C!#8!@AD!I&D8C@A!#G!@AD!98@DBDI@k_0!\$.347@((]'()! ^. ?8LA4! 5\$4! L#8L<BB98C_! ^8#@98C! @A7@! 98@DB; D8@#8! j A711m! M7B@JL<=7B! G#BLD! [ADBD! @AD! I<>iDL@n !9I!#G!CBD7@M<>=JL!98@DBDI@!!@AD!98@DB; D8#B!A7I!7!BD7=!1@7aD!98!@AD!#<@L#ED!78: ! @AD!98@DB; D8@#8! E7?! [D=!71191@@AD!L#<B@!98! \to !@AD!GB7 E98C!#G!@AD!911<D1k \$!Q8!7!L71D! [ADBD! 78! <8[9D=: ?! 8<E>DB! #G! @A9B: ! M7B@DT! T#<CA@! @#! 98@DB; D8D! [9@A! 7=@DB87@]; D! 7BC<ED8@14!8#@A98C![#<=: !MBD; D8@17!L#<B@16B#E1: D@DBE9898C!@A7@1#8=?!LDB@798!M7B@1

L7ID\$!?,,49%&"4!#+,7450347@Z**'*Y\$!P<B@ADB4!8#!DF91@8C!M7B@?!IA7BDI!2MMD=78@R!98@DBDI@98!7!i<: CED8@@A7@;98:9L7@DI!@AD! b9@D!Qq!-<-D!#8!@AD! EDB9@!78:!#8!L#8I@@<@#87=!CB#<8: I\$!Q8!G7L@!@AD! 6DM7B@ED8@MB9E7B9=?!IDDaI!:9IE9II7=!G#B!=7La!#G!I@78:98C4!7!M#19@#8!@A7@:9BDL@?!L#8@37:9L@!2MMD=78@R!M#19@#8!78:!98@DBDI@\$!!?,,46#L\$!`]!7@+'%(Q!6#L\$!(**!7@('`\$!2MMD=78@R!L#8I@@<@#87=17BC<ED8@!>D=#8C!98!@A9I!L7ID4!78:!@AD?!IA#<=:!@A<I!>D!7=#[D:!@#!MBDID8@@AD9B!7BC<ED8@!7I!M7B@DI\$!

X=798@GGIR! DGG#B@! #!: #[8M=7?! 2MMD=78@R! L#81@@@#87=! 7BC<ED8@! 7BD!

<8MDB1<719; D\$! ?, ,4X=GI\$'KB\$! (`'%)\$! X=798@GGI!711DB@ @A7@G#B! 7!: %GGDBD8LD! 98! 98@D8: D:!

7BC<ED8@!@#!D; D8!>D!BD=D; 78@!j @AD!E#; 78@E<I@IA#[k!@A7@@AD!8D[!7BC<ED8@91!
jpL=D7B=?!AD=MG<=R!#B!pD11D8@7=Rk!#B!@A7@jpM<BI<>9@#G!@AD!1A7BD: !C#7=!#>; 9#<I=?!L7=I!G#B!

@AD!7BC<ED8@@#!>D!E7: D4Rk!X=GI\$'KB\$! (`'%&4!MAB71DI!: B7[8!BDIMDL@; D=?!GB#E!-#;;,&#!78:!?&6.,%W(4'0748#\$74*.B\$((\$0%(\$!K<@8D9@ADB!BD=D; 78@M7117CD!M<BM#B@!@#!G#BE<=7@D!7!

8DLD117B?!L#8: 9@#8!G#B!987: Dc<7L?4!E<LA!=D11!@#!DBDL@71!A9CA!7!>7B!71!X=798@GG!!I<CCDI@!

08!-#;;,&#!@AD!/#<B@#>1DB; D: !98!M71198C!@A7@7!M7B@?R!!8DC=DL@#G!j #>; 9#<1!7BC<ED8@k!

>06".41A#[!@A7@BDMBD1D8@@#8![71!987: Dc<7@4!@AD8@98!M7B@>DL7<ID4@AD!E#; 78@R!

^{!!} X=798@GG!! L#8@D8: ! @A7@! 2MMD=78@R!: 917CBDDED8@! [9@A! @AD! 6DM7B@ED8@!#; DB! 1@78: 98C!91!9BBD=D; 78@!>DL7<1D!X=798@GG!!@ADE1D=; D1!<MA#=: !@AD98!# [8!1@78: 98C\$!?,,4X=@1\$

7BC<ED8@! [DBD! j L=D7B=?!AD=MG<=k!78: ! j MDBA7MI!D; D8!DIID8@7=k!@#!@AD!: DGD8ID@ G#<8: !
@A7@ 8#@A98C! ><@ j IMDL<=7@#8k! I<MM#B@D: !@AD! GD7B!@A7@@AD!: DGD8: 78@ 7L@<7=?! E06".4

8DC=DL@@A#ID!; 9@=17BC<ED8@\$!()%!P\$Z: !7@((%\$!08!?&6., \\(\delta\)(4'0748#\$74*. B\$((\$0%(4!@AD!)/#<B@
#>IDB; D: !@A7@! @#! 7IIDII! [AD@ADB! G79=<BD! @#! E7aD! 78! 7BC<ED8@ L#8I@@<@:! j +,74 (,4

987: Dc<7@Dk! BDMBDID8@7@#84! 9@ [#<=:! j 71ak! [AD@ADB! @AD! 7BC<ED8@ [71! j #>; 9#<1=?!

L7=ID: mG#B\$k!+&)!P\$Z: !7@*)]\$!Q@AD8!AD=: !@A7@AD!E#; 78@R!MB#M#ID: !7BC<ED8@: 9: !8#@
I<MM#B@.98@B; D8@#8!>DL7<ID! 9@ 7L@<7=?! 6%. ,7B\$%, .4@AD! M#19@#8! @AD?! IA7BD: ! [9@A! @AD!
: DGD8: 78@!9. 308!L#8@F@!9@ E7aDI!8#!ID8ID!@#!BD7: !D9@ADB!L7ID!7I!DI@>=91A98C!7!IMDL\%9L!
G=##B! G#B! i<I@ A#[! j AD=MG<=k! #B! j #>; 9#<Ik! 78! 7BC<ED8@ E<I@ >D! >DG#BD! 9@ G7; #BI!
98@DB; D8@#8\$!

Q8!78?!L7ID4!2MMD=78@IR!L#81@@<@#87=!@AD#B9D1!7BD!j#>;9#<1=?!L7=ID: mlG#B\$k!9.3!QG!

L#<B@!!L78!BDiDL@47!LA7=D8CDBRI!DBB#8D#<I!=DC7=!7BC<ED8@|\$!2MMD=78@|R!L#8|@@<@#87=!
@AD#B9D!!7BD!>#@A!BD=D;78@!78:!9EM#B@78@|@#!@A9I!L7ID\$!

X=798@GG!!7BD! [B#8C!@#!:91E911!2MMD=78@R!L#81@@<@#87=!7BC<ED8@!71!

L#869: D8LD!@A7@2MMD=78@1R!L#81@@<@#87=!7BC<ED8@1!L#<=: !8#@766DL@@AD!BD=DG!#B: DBD: !
91!MBDE7@<BD\$!

^: 91L<1198C! MBD; 9#<1! BDE78: ! [ADBD4! 7>1D8@! 7: : 9@#87=! DFM=787@#84! @A91! /#<B@! [71! j <87>=D!@#!MDBG#BE!7!ED7898CG<=!BD; 9D [k!#G!#B: DB!: D8?98C!98@DB; D8@#8_\$!

X=798@GG1!9C8#BD!@ADID!7BC<ED8@1!<8@=!@AD!=71@@F#!M7CD1!#G!@AD9B!>B9DG4!78:!D;D8! @AD8! 7@7La! #8=?! I@7 [ED8\$! ?,,4 X=@f|\$'KB\$! Z)'Z+\$! /#8@B7B?! @#4 X=798@GGTR! 711DB@J#84! 2MMD=78@1!: #!8#@L#8@D8: !@A7@.7!1A#B@::91@B9L@'L#<B@::DL919#8!91!jp7!MDB!ID!7><ID!#G! : 91LBD@#84Rk!\$. 347@Z+!^c<#@98C!O)/OJ\$",4N,34DD54134O0E%40'4H#7%(&#J",4!`]`!P\$Z: !ZZ4!Z+! ^(I@!/9B\$!%&%&_0!(_,4#"(04\$.347@!(*!^98L#BBDL@?!I@7@|8C!@A7@||H#;78@|R!I#=D!7BC<ED8@|9I!@A7@| @AD!:91@B9L@L#<B@R!!#B:DB![7!!@##!>B9DGK_4!8#B!:#!2MMD=78@!71a!@AD!/#<B@!@#!19EM=?! _i 711<EDk!i@AD!=D71@pCD8DB#<1!M#119>=D!BD7: 98CR!#G!7!1<EE7B?!#B: DB4k!\$. 347@Z)\$! — 7@ADB4! 2MMD=78@1! M#98@ #<@ @A7@ @AD! : 91@B9L@ L#<B@R!! BD71#814 G#B! : D8?98C! MDBE9119: D! 98@DB; D8@#8! 7BD! #>IL<BD! : <D! @#! @AD! L#E>987@#84#G! ^(_!@AD! : 91@B9L@! L#<B@KI! E989E7=! DFM=787@#84!^%_!9@!!@#@7=!G79=<BD!@#!IA#[!^D; D8!L<BI#B9=?_!@A7@!9@!: 91@98C<91AD: !MDBE9119; D! 98@DB; D8@#8!GB#E!98@DB; D8@#8!71!#G!B9CA@!78: !^Z !@AD!@#@7=!7>1D8LD!#G!7BC<ED8@!!7C7981@ 98@DB; D8@#8!98!@AD!BDL#B: \$!?,,!KB\$!(Z4!Z('Z%4!ZY\$!2MMD=78@!!7=1#!IA#[!@A7@D; DB?!M#119>=D! 98@DBMBD@7@#8!#G!@AD!L#<B@XI!: DL919#80 98L=<: 98C4@AD!| B0(&!CD8DB#<1!M#119>=D!BD7: 98C4k! KB\$!%`4!Z*!^DEMA7191!7::D:_O98;#=;D1!D9@ADB!=DC7=!DBB#B4!7!G79=<BD!@#!L#819:DB!BD=D;78@! -<-D!%*^>_!^7=#8C! [9A!D; DB?! #ADB! j B79#87=?! BD-D; 784! L#819: DB79#8K_4! 94 91! 8#4 71! LB99L74 ADBD! 71! 94 91! <8: DB! -<-D! %*^7_%_! ^G#B! [A9LA! 987: Dc<7L?! 91! j 78! 98*8L=7:! BDc<%BDED846_\$!?,,!KB\$!%) '%+\$!/948C!A91!-<-D!%*^7_%_!GTL#B!7=#8D4! [9A#<4MB#; 9: 98C! 78?!#ADB!BD71#898C!#B!D; D8! ED89#898C!MDBE9119; D!98*0B; D89#84!9!!8#4D8#<CA!#!>D! | CAPA ADB! BD71#898C!#B!D; D8! ED89#898C!MDBE9119; D!98*0B; D89#84!9!!8#4D8#<CA!#!>D! | CAPA ADB! : 91*69L4 L#<B4 &S=?! DFDBL91D:! 94! : 91LBD*9#8\$! X=798*6G!! DFMBD11! j M<hh=|DED8**ak! 74 AD! 8#9#8! A74 AD! : 91*69L4 L#<B4 E9CA4 A7; D! G79*D:! #! L#819: DB! MDBE9119; D! 98*0B; D89*BB; D89*BB; D89*BB! E#9#8! #! 98*0B; D80\$k! X=G1\$' KB\$! Z)! 8\$*\$! K<4 94: #D1! 8#4 G#=#[!*A74 AD!: 91*69L4 L#<B4 : D89D:! AD! D8*BD! E#9#8! #! 98*0B; D80\$k! X=G1\$' KB\$! Z)! 8\$*\$! K<4 94: #D1! 8#4 G#=#[!*A74 AD!: 91*69L4 L#<B4 : D89D:! 91*69L4 L#<B4 : AD! D8*BD! E#9#8! #! 98*0B; D80\$k! X=G1\$' KB\$! Z)! 8\$*\$! K<4 94: #D1! 8#4 G#=#[!*A74 AD!: 91*69L4 L#<B4 : P8*0B; D8*DB! B\$* AD!: 91*69BB\$* AD!

X=798@CG1! 7=1#! 7@DEM@ #! I<MM=?! 7! E9I198C! B7@#87=D! G#B! @AD! : 9I@9L@ L#<B@R!!

MDBE9119; D'98@DB; D8@#8! B<-98C\$! bAD?! I<CCDI@ @A7@ @AD! : 9I@9L@ L#<B@R!! BDGDBD8LD! #! 78!

7 E9L<14>B9DG! [71!7E#8C!9@1!7,#(0%(4G#B!: D8?98C!98@DB; D8@#84!78!98@DBMBD@@#8! [9@A!8#!
I<MM#B@98!@AD!@DF@#G!@AD!E98<@D!#B: DB\$!X=G1\$'KB\$!Z*\$!bAD?!I<CCDI@@A7@@AD!: 9I@9L@L#<B@
j L#8L=<: DI: m@A7@@AD!L#I@!#G!98@DB; D8@#8! [#<=: !#<@[D9CA!@AD!>D8DG9@4k!D; D8!@A#<CA!

@AD!: 9I@9L@L#<B@179: !8#@A98C!7>#<@D9@ADB!L#I@!!074>D8DG9@178: !A7: !8#!I<LA!7BC<ED8@!
>DG#BD!9@ [AD8!9@B<-D: \$!X=G1\$'KB\$!Z*'ZY\$!X=798@GG1!D; D8!I<CCDI@@A7@@AD!: 9I@9L@L#<B@
[71!98G=<D8LD: !>?!78!<8BD=7@: !: 9IL#; DB?!: 9IM<@D!98!@AD!M7B7=D=16\$6\$/\$!L7IDO 7!: 9IM<@D!
@A7@@AD!: 9I@9L@L#<B@ 8D; DB! ED8@#8D: !78: !@A7@ 8#>#: ?!98!@A9!!L7ID!>B#<CA@ #!9@!

7@D8@#8\$! X=@I\$'KB\$!Z]\$!OB#89L7=?4!@ADID!IL7@DBIA#@C<DIIDI!#8=?!L#8G9BE!2MMD=78@R!
M#19@#8T!@A7@DGG#B@!@#!:9;98D!@AD!:91@B9L@L#<B@R!!BD71#898C!7BD!M<BD!IMDL<=7@#8\$!KB\$!Z*\$!!

X=798@GG1!7=1#!IDDE!@#!@A98a!@A7@@AD!:91@9L@L#<B@R1!981LB<@7>=D!BD71#898C!91!8#!
#>I@L=D!@#!7GG98E78LD!71!=#8C!71!j@AD!:91@9L@L#<B@R1!<=@E7@D!L#8L=<19#8![71![9@A98!9@!
>B#7:!:91LBD@#8\$k!X=G1\$'KB\$!(*0!(,,4#"(04X=G1\$'KB\$!Z*4!Z)4!Z+\$!S8!@A91!;9D[4!@AD!aD?!
c<D1@#8!91!8#@[AD@ADB!@AD4:91@9L@L#<B@7MM=D:!@AD!B9CA@1@78:7B:!78:!BD71#87>=?!
[D9CAD:!BD=D;78@G7L@#B10!B7@ADB4!@AD!aD?!c<D1@#8!91![AD@ADB!@AD!7MMD=7@4L#<B@!
L#819:DB98C!j@AD!BDL#B:!71!7![A#=D4k!L78!G98:!#%K@BD71#87>=D!CB#<8:!@#!BD@B#IMDL@;D=?!
i<I@G?!@AD!17ED!j<=@E7@!L#8L=<19#8\$k!X=G1\$'KB\$!(*\$!!

K<@A7@91!8#@A#[!7><ID'#G': 91LBD@#8!BD; 9D[![#Bal\$!f<9D!@AD!L#8@7B?7!j bA91!

IL#MD! #G! BD; 9D[! 8DLDI17B9=?! D8@79=!! L#819: DB7@#8! #G! @AD! BD71#81k! @AD!: 91@9L@ L#<B@7L@<7=?!BD=D: !#8\$! * B3#F0B,4* ((67#%>,4503#1349%(6"#74G%.,7E7%,7(4507+34!*`*!P\$%: !Z()4!Z%&!

^(!@/\$\$!(`)*_\$!bA<14!7MMD=7@!L#<B@!B#<@8D=?!BDE78: !: 91LBD@#87B?!B<-#8C1![AD8!9@91!

<8L=D7B![AD@ADB!@AD?!98; #=; D: !78!7><ID!#G!: 91LBD@#84!!<LA!71!7!G7<=@?!=DC7=!@78: 7B: !#B!

8DC=DL@#G!9EM#B@8@G7L@#BI\$!?,,,,4,3;3!R\$7&(#,%;413400<%4A\$",K4M4?0%(@9%34!(Z]!3\$!/@!(`)`4!

(`+`!^%&(]_!^M#119>=D!8DC=DL@#G!BD=D;78@G7L@#BI_M87,(<4:,(6"&(@DD54134*?84F0""#%.@H3P34!*%(!P\$Z:!(&*Z4!(&Y(!^(@A!/9B\$!%&(`_!^M#119>=D!8DC=DL@#G!BD=D;78@G7L@#BI_D!

/#&&<,E(4134A<&;4,4!+&)!P\$Z:!)Y]4!)]Z!^]@A!/9B\$!%&(Y_!^<8L=D7B![A7@=DC7=!@78:7B:_\$128:!

[AD8!@AD!@97=!L#<B@7MM=DD:_04-#;;,&&4!()%!P\$Z:!7@((Z'(*!^M#119>=D!G7<=@?!=DC7=!@78:7B:_\$128:!

[AD@ADB!@A7@BD71#898C! [71!78!7><ID!#G!: 91LBD@#8\$!?,,4/\$\square 34?&#&,4*8D)59L4!(&Z!P\$Z:!
7@!(%*+045#&,7\$%04!`%%!P\$%:!7@Z`\$!!

-#;;,&A; 9; 9: =?!9=< | &7 @ | [A?!X=798@GGIR!@AD#B?!#G!BD; 9D [!9!!E9!@aD8\$!bADBD4!@AD!

/#<B@ DFM=JL9@?4 L#8L=<: D: ! @A7@ @AD! : 9!@9L@ L#<B@R!! >#@#E'=J8D! BDI<=@ ^: D8?98C!

98@B; D8@#8_! [71! [9@A98!9@!!: 9!LBD@#8\$! () %!P\$Z: 47@ ((Z\$!OG!X=798@GGIR!@AD#B?!#G!BD; 9D [!

[DBD!L#BBDL@!@A7@IA#<=: !A7; D!>DD8!D8#<CA!@#!7GG98E\$!K<@9@ [7!8R@!081@D7: 4!@AD!/#<B@]

; 7L7@: ! 78: !BDE78: D: !C9; D8! j @AD! M#119>9-J@?k! @A7@ ^(_! @AD!: 9!@9L@ L#<B@!B\$;<&A7; D!

E9!<8: DBI@##: !@AD!=7 [!78: !^%_!@A7@ j M#119>=|Dmk!E9!<8: DBI@78: 98C!B\$;<&A7; D!7GGDL@D: !

9@!DFDBL9!D!#G!: 9!LBD@#8\$!9. 3/bAD!=DII#8!9!!M=798T!J AD8!9@R!!j <8L=D7BK!9G!7!B<=J8C!BDI@!#8!

78!7><ID!#G!: 9!LBD@#84!@AD! /#<B@ IA#<=: !; 7L7@!78: !BDE78: !G#B!BDL#819: DB7@#8!#B!

L=7B9G9L7@#84!D; D8!9G!@AD!BDI<=@L78!>D!!

X=798@GG1!>B<1A!719: D! - #;;,&&471!7!L71D! [ADBD!j @AD!: 91@B9L@L#<B@.E917MMBDAD8: D: !

@AD!=7 [!98!787=?h98C!98@DB; D8@#8!71!#G!B9CA@\$k!X=@G1\$'KB\$!Z+\$!bA7@>BDDh?!: 91E9117=!E911D1!

@AD!M#98@98!@ABDD!: 91@98L@ [7?1\$!P9B1@!98! - #;;,&&A9@ [71!#8=?!j M#119>=1Dmk;

`%(!P\$Z: !7@(&Y(!^G#B<E!8#8!L#8; D89D814: DL919#8_U/#&&<,E(4!+&)!P\$Z: !7@)]Z']*!^: D897=!
#G!G<8: 98C!@#!: D; D=#M!E9@C7@#8!D; 9: D8LD_\$!!

I < GG9L9D8@?!L=D7B!: DIM9D!=)E9D: !DFM=787@#8"!#B!L7IDI! [ADBD!@AD!BDL#B: ! < 8DC < 9; #L7=?!

I < MM#B@D: ! #8=?! #8D! # < @L#ED\$#! bA7@ 7! BDE78: ! 9I! #>; 9# < I=?! < 88DLDII7B?! 98! @A#ID!

ILD87B9#I!: #DI!8#@I < MM#B@7!CD8DB7=!B < =D!@A7@: 9I@9L@L# < B@!%, 1, 748DD: !@#!DFM=9L7@D!@AD9B!

#>IL < BD!: DL9I9#8I4!7!B < =D!@A7@ [# < =: !L#8G=9L@ [9@A!@AD!BDE78: I!98! - #;;,&&4! () %!P\$Z: !7@

((Z'(*4!78: !98!5#&,7\$%04!` %%!P\$%: !7@Z`\$!

O) / OJ\$",49@| D=G! =9aD=?! >D=#8CD: !@#! >#@A! L7@DC#B9DI\$! O8=9aD! @A91! L7ID4! @AD!: 91@B9L@|
L#<B@! 98! O) / OJ\$",4

^: #LaDd L\@7\\#81! #E\@D: _\\$! P<B\@ADB4! O) / OJ\\$",! BDiDL\@D: ! \@AD! E#; 78\\@R! 7BC<ED8\\@! G\#B!

98\\@DB; D8\\@\#8! 71! [A\#=?! \981<> |\@78\\@74! 78: ! <8: D; D=\#MD: 4! BD8: DB\98C! \@AD! : \91\\@9L\\@! L\#<B\\@R!

MBDL\91D!B7\\@\#87=D!E\##\@^78: !78?!BDE78: !G<\@\=D_\\$!?,, \@,3;3\\Particle{A}\

bA91!L71D!91!: %GDBD8d#8!>#@A!IL#BD1\$! 2C7984!@AD!: 91&9LdL#<BdA7: !8#dAD7B: !7!

(\$%;",47BC<ED8d7C7981d2MMD=78dR!E#@#8![AD8!9d1<EE7B9=?!: D89D: !9&!28: !@ADBD!L78!

>D!=D@D!: #<>d@A7d@AD!: 91&9LdL#<Bd>06". 4<#1,!7=#[D: !2MMD=78d!@#!98dB; D8D!^i<1d=9aD!

@AD!6\$6\$/\$!: 9: _![9@A#<d7><198C!9d!: 91LBD@#8\$!J AD@ADB!@AD!L#<Bd7><1D: !9d!: 91LBD@#8!

>?!: D8?98C!MDBE9119; D498dDB; D8@#8!91!9EM#119>=D!@#!dD=![9@A#<da8#[98C!9d!BD71#81!G#B!

: #98C! 1#\$! "D9@ADB!@AD! E98<dD!#B: DB! 9dD=G! 8#B!@AD! BDL#B: !E7aDI!@A#ID!BD71#81!L=D7B\$!

bA<14!7!BDE78: !91!8DLD117B?\$!

 0!GD: !@A91! > B9DG!; 97!@AD! / # < B@RI! 1 / P! 1? I@D E 4! [A9LA! [9-!D = D L @B # 89L7 = ?!8 # 9G?!7 = ! B + BPL7 = P! B

L#<81D=!BDc<9B98C!8#@LD\$!!

67@D: T!6DLDE>DB!)4!%&%&!!!!!X(X45#B,70%4O34N077\$(4444!