```
!
                             !"#$%"&'()) *\%""\& + \"\*#, & - .\%(/\"0\&12\&4516\&
!
  #$
       \%\&''!()!)*+,*-!6789\&:+!!
 ##$
       *)''!%&''!
       ; 0"<"#%-! ./0012341! 5 2678129! : 3; <47! =>71</?9! +2/?@! A20/6629! &<\begin{align*} \text{B76/82!} \text{ O7!} \ '7; <9! \ \text{C>?4/<!} \\ \text{C>?4/<!}
!
!
       D73820; 9! E2/32! A737F9! &?167@! +762GG29! +7??/377! %>7H2? 9! I37?142! . 123/J/9! =237 <! A232029!
       =3/?4; G173! +/?123; ;<!!
!
!
!
        :/<"#%-!A243/8/2!*7K2620;9!:3/44<7@!L;67F9!A743!%1>0/<;H9!+2H/O!5/6626;M;?9!C;876@<!:260;<!!
###$
       &% (#) N!#(, D!0! :==0(>\$?\&(@\&MA"\&:,"#B\$!)
!
       + (\%'(\#!4; !2GG3; \H7!417!2K7<02!C\\;\$0\$B\$9!?78; <0!\\@!\E\\'\\F''>\$<9!\P;\\/;<! ':\GGHI!\$!!
#5$
       + (\(\)*(\(\pi\)! 4; ! 2GG3; \(\pi\); 417! \(\P/\)<>47?!; \(\J\)!) 84; \(\pi\)73! "\(\Omega\)! RO"S! \(\mi\)@! \(\bar{E}\)\(\mi\)' \(\bar{F}''\)>$<9! ?78; <0! \(\mi\)@! \(\bar{E}\)\(\mi\); \(\bar{B}\)*??$9!
!
       P;4/;<!':GGHI!$!!
       AT: '#%!%) DD, N(!U!; F/?*.&'()) "#%&*<&*#%"#B"B&$<&$&%*) "&@(O&$#J&)") /"O&(@&%A"&=F/?*.&
 5 $
       M$JD!
!
       N;!A>M6/8!\%; PP7<4\$!
5#$
       TNI#N#.V. + !#(.D. -!!
!
       N: !T<J/</?170!#47 P?$!!
5##$
       N, W! : T. \#N, ... \#(, D. -!)
           &$ &% (#) N!#(, D!0!E(#F%<&$#B&'(@@'''&!
               (17!.7<247!X/66!42Y7!284/;<!;<!>?/<K!Z[QQ!J3; P!417!.7<247!M>OK74!4;!J><0!417!+;<>4?!2<0!
               %; JJ77!7H7<4$!
```



+ (%\*(#!4;!2GG3;H7!417!M>OK74!4;!J><0!Z[QQ\$QQ!J;3!417!+;<>4?!2<0!%;JJ77!7H7<4!M@!**N**D& !**A\$0**\*@\*9!?78;<0!M@!**C**D&;**\$0\$B\$**9!**P**;4/;<!':**GGHI!**\$!!

**E**M; \$B\*??\$!2?Y70!/J!?17!?2/0!>G!4; !Z[QQ\$QQ\$!NM! **A\$0**\*@\*!?4247?!4124!?17!B>?4!?2/0!Z[QQ\$QQ\$!

44780!

!

:\$ +#.%T..#) N!#(, D!0!: '&P0\$#<\*\&><\&!AF\\\?'\&!'\0>\*.'\&G''<(?F\\\*(#!) (17!.7<247!X/66!0/?8>??!20;G4/<K!2!37?;6>4/;<!4;!20037??!3787<4!07H76;GP7<4?!/<!! 432<?G;3424/;<!?73H/87?!J;3!?4>07<4?\$!

QM + "0.\$B5@50475 - 3%(\$0) 0.(N) 0.2 - 2589.92500050291.6504 - 80TMT21Tf!) TJ5 - 3%(\$0) 0.(N)

(32<?/4!M>?!?4;G?!4124!X2@!;>3!?4>07<4?!82<!K74!;<!2<0!;JJ!;<!/<!0/JJ737<4!82 PG>?!6;824/;<?\$! W1/81!/?!M74473!M782>?7!417!.1>4467!;<6@!G/8Y?!>G!/<!J3;<4!;J!417!\*&W9!266!417!;4173!?4;G?! 237!B>?4!O3;G!;JJ!G;/<4?\$!**E**M**'F''>\$<**!?4247?!4124!41737!/?!2!82**P**G>?!6;;G!?1>4467\$!**W**/66!41737!M7! 2!?/P/623!G241X2@c!**0**\mathbb{\text{M}} + "**0.\$B**(!?4247?!4124!X/41!&\text{M}!(32<?/4!417@!X/66!P2Y7!2!M>?!?4;G!4124! /?!86;?73!4;!417!T</H73?/4@!5/662K7!M>4!/4!X/66!M7!2!6/4467!;J!2!J>34173!X26Y!8;PG2370!4;!417! 4124!+733/8Y!?2/0!417@!82P7!>G!X/41!2!078/?/;<!;>!D;<02@!M>4!12?!<;4!M77<!2M67!4;!K74!/<! 8;<4284!X/41!417P\$!#!?4/66!12H7!<;!>G0247!?;!#!0;<b4!Y<;X!X124!417/3!078/?/;<!/?\$!CM;\$0\$B\$! ?4247?!4124!;<!417!8;<?!6/?4!/4!?4247?!4124!41737!/?!<;!M>?!>?7!J;3!8; P P7<87 P7<4!<787??/4/7?! X1/81!82<!M7!812<K70!07G7<0/<K!X1737!8; PP7<87P7<4!X/66!M7!1760\$!W7!26?;!X; <br/>54!12H7! 2<@!328Y70!M>??7?!4;!20H734/?7!J;3!%26!.4247!,2?4!:2@\$!#4!/?<b4!2!M/K!0726!M>4!X7!?1;>60!?77! /J!41737!237!2<@!0726?!X7!82<!K74!X/41!&%!(32<?/4!37K230/<K!20H734/?/<K9!/J!X7!237!?/K</<K!  $X/41! \ 417 P \$! \ Q0\& + "0.\$B(! \ ?4247?! \ 4124! \ \&\%! \ (32<?/4! \ X/66! <; 4! \ M7! \ 2M67! \ 4; ! \ 176G! >?! \ X/41!$ 8; PP7<87P7<4\$!A23Y/<K!2<0! (32<?G;3424/;<!237!6;;Y/<K!4;!1/3/<K!2!?1>4467!8; PG2<@!B>?4! J;3!8; PP7<87P7<4\$!&?!J;3!20H734/?/<K9!417!M>?7?!4124!X7!X/66!>?7!X/66!M7!20H734/?/<K!%26! .4247!, 2?4!: 2@\$! ( 1737!X/66!M7!?/K<!G2<76?!4124!237!K;/<K!4;!M7!/<86>070!;<!417!M>??7?!4124! 3><!4; |82 PG>?!M>4!; <!; 4173!M>?7?!2?!X766\$!CW; \$0\$B\$\(2?Y?!/J!\)417!/</4/26!\%6/GG73!\(230!/?!J377!) 4;!?4>07<4?!;3!X/66!417!?4>07<4?!12H7!4;!G2@\$!QW+"0.\$B(!?4247?!4124!417!&%!(32<?/4!X/66!M7! J377\$! .4>07<4?!X/66!>?7!2!?/P/623!H73?/;<!4;!417!%6/GG73!%230!M>4!/J!417@!6;?7!/4!417<!417@!X/66! 12H7!4; !G2@!Z]\$QQ\$! (17@!X/66!M7!2M67!4; !>?7!417!823O!2?!P2<@!4/P7?!2?!417@!X2<4\$!**E**]&; **\$B\***??**\$**! 2?Y?!1; X!417!?4>07<4?!X/66!3787/H7!417!86/GG73!8230?!; 3!X/66!417@!M7!>?/<K!417/3!: 2@!%230?\$!! **QDk** + "**0.\$B**(!?4247?!4124!417!8; <43284!X7!12H7!X/41!417!?1>4467!X/66!7dG/37!; <! +787 PM73!] "9! RO"S\$!#J!X7!K;!X/41!417!&%!(32<?/4!A23Y/<K!2<0!(32<?G;3424/;<!417@!X/66!M7!12<0/<K!;>4! 417!8230?!4; X230?!417!7<0!; J!417! I 266!?7 P 7?473\$! (124!X2@!417!?4>07<4?!X/66!M7!2M67!4;!?4234! >?/<K!&%!(32<?/4!/<!/<!417!?G3/<K\$!**E**M**;**\$**B\*?**?\$!2?Y?!1;X!X/66!417@!M7!G2??/<K!;>4!417!8230?\$!! QW + "0.\$B(!?4247?!4124!A23Y/<K!2<0!(32<?G;3424/;<!43/70!4;!K74!417!,2?@!\*/073!86/GG73!8230! /PG67P7<470!/<4;!;>3!: 2@!%230!M>4!417@!X737!<;4!2M67!4;\$!&66!?4>07<4?!4124!X2<4!4;!>?7!417! &%!(32<?/4!X/66!12H7!4;!8233@!23;><0!417!,2?@!\*/073!%6/GG73!%230!2<0!417/3!:2@!%230\$!#J! X7!K;!X/41!&%!(32<?/49!4;X230?!417!7<0!;J!417!?7P7?473!A23Y/<K!2<0!(32<?G;3424/;<!X/66! 



2M67!4;!>?7!&%!(32<?/4!6/<7!2<0!(32<?M2@\$!CME\*<A\$0((#!2?Y70!/J!17!6;;Y70!/<4;!417!?@?47 P! 4124! . 2<! I32<8/?8;! . 4247!12?!X/41! D></!2<0!/J!417@!/<47K3247!417/3!%6/GG73!%230!/<4;!417/3!?4>07<4!#+b?\$!QM+"0.\$B(!?4247?!4124!417/3!%6/GG73!%230!/?!/<8;3G;32470!/<4;!417/3!?4>07<4! #+b?\$! CM E\*<A\$0((#!2?Y70!1;X!417@!?4/66!>?7!417!%6/GG73!%230\$!(17!a>7?4/;<!/?!1;X!0;! 417@!/<47K3247!417/3!86/GG73!8230!X/41!417/3!?4>07<4!#+\$! D2@M7!X7!82<!8;<784!4;!X1;7H73! 0;7!!;>3!:2@!%230!4;!417/3!37?;>387?\$!!

QNk + "0.\$B(!?4247?!4124!/4!P/K14!M7!M782>?7!417!, 2?@!\*/O73!/?!2<;4173!J;3P!;J!G2??!/4!/?!<;4!

<2P7!/4?76J!?;><0?!/<4/P/024/<K!2<0!0;<b4!J776!X768; P70\$!C>?4!M782>?7!X17<!417@!237!/<!2!
?4247!; J!83/?/?!417@!X2<4!4; JJ776!?2J7!2<0!4124!417/3!J776/<K?!237!<; 3P26/F7?!2<0!<; 4!?77<!2?!2!
83/?/?\$!#!12H7!M77<!2447<0/<K!41; ?7!P774/<K?!2<0!12H7!M77<!43@/<K!4; JJ/K>37!; >4!2<; 4173!?74!
; J!62<K>2K7\$! %>337<46@!41737!/?!<; !8;><?76; 3!24!417!0; 3P?!M782>?7!X7!237!6; X!;<!?42JJ\$!
V;G7J>66@9!X17<!417@!1/37!P;37!8;><?76; 3?!;<7!X/66!M7!G62870!24!417!0; 3P?\$!W17<!4124!
0;7?!12GG7<9!#!X2<4!4; JJ/<0!2!M74473!X2@!4; !20H734/?7!417/3!?73H/87?\$!(124!X2@!P;37!?4>07<4?!
82<\>?7!417/3!?73H/87?!/J!417@!<77070!4; \$!: ME"=\$==\$!?4247?!4124!417!8;><?76; 3?!82<!M7!J;><0!
/<!.7a>;/2\$!&?!2<!\*&9!#!0/0<b4!Y<; X!P>81!2M;>4!417!8;><?76; 3!4124!X7!>?7!4; !12H7!2<0!/4!
/?!/PG;342<4!4;!20H734/?7!417/3!?73H/87?!; <87!X7!K74!;<7\$!RM; "0"S!2?Y70!1; X!237!?4>07<4?!
?>GG;?70!4; !K74!/<4;!.7a>;/2!4; !?77!417!8;><?76; 3\$!(17@!?1;>60!G>4!417!8;><?76; 3!/<! '2??7<!
;3!?; P7X1737!P;37!2887??/M67\$!#J!417!8;><?76;3!/?!24!.7a>;/2!/4!P2Y7?!/4!?77P!4124!/4!/?!;<6@!
J;3!J37?1P7<\$!: ME"=\$==\$!?4247?!4124!?17!X/.2(7)0.(")0.2?/<4;!812A@["\$p.@\$X;\0"0"\$!\0"2}!\0"6@!\0"4?!?\$]</pre>

%\$ .7<24;3!;J!.8/7<87!^R!P/<>47?`!

**E**D; **\$B\*??\$**!412<Y?!417!.7<247!J; 3!J><0/<K!; <7!; J!417!02@?!; J!173!%; JJ77!2<0!+; <>4?!7H7<49!
8; P7!M@!2<0!?>GG; 34\$!#!X2<4!4; !12H7!7H7<4?!X/41!417!+7G234P7<4!4124!X2@!417!?4>07<4?!?77!
4124!X7!8237!J; 3!417 P\$!#!2 P!26?; !X; 3Y/<K!; <!K744/<K! P; 37!42M67?!/<!J3; <4!; J!417!.8/7<87!
M>/60/<K\$!A672?7!8; P7!4; !417!.8/7<87!17?4/H26!; <!) 84; M73!R\_4¹9!/4!/?!; G7<!4; !266\$!!

+\$ .7<24;30240 '23K7!^R!P/<>47?`!

: DB''&U'' (#!?4247?!4124!?17!X/66!M7!J;8>?/<K!;<!?4>07<4?!D7<426!V72641!41/?!@723\$!#!X2<4!4;!

?77!/J!X7!82<!837247!2!G;66!;3!?>3H7@!4124!?4>07<4?!82<!?77!417/3!P7<426!172641!2<0!X7660



MD\(\textbf{CF''A#\*<\cdream\(2477\)!4124!417@!12H7!3><!;>4!;J!4/P7!2<0!7H73@;<7!X1;!0/0<b4!K74!4;!?4247!2!
37G;34!X/66!0;!?;!<7d4!P774/<K\\$!ED\('\textbf{E}\)\('\textbf{F''}>\\$<\cdream\(227\)?!J!417@!237!266;X70!4;!7d47<0!P774/<K!M@!
"Q!P/<>47?\\$!MD\(\textbf{CF''}\textbf{A}#\*<\cdream\(247\)?!4124!?17!X/66!<770!2!P;4/;<\\$!!

+ (\%'(\#\4;!7\d47<0!P774/<K!M@!"Q!P/<>47?!M@!EW'F">\$<3\\?78;<0!M@\CW;\$0\$B\$%P;4/;<!



f!

Table 1

