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AUGUST 1, 2024

!"#\$%&'(!!)#&(\*&" +, &-&. )/0#%!

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

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"# $%&'()*+!,(-. (/0#####%$!
&$ '()*+,-./0102.#####$$"
3$ 45&6'7(*+0(8"7(296*:+;*1*2/.*(2"()*+ ,#####%"
5$ <0:(=;+0:#####$$>
""# 1'&*!"2!1+%3#####?"
&$ @*)0"AB"5((;C*2/.(;#####$D"
3$ A2COE02CO2+0F"3"/:F"/2C"5(28)*+.:("8"A2.0;0:.#$$#####SSD"
5$ GH0;:*1J."(8"A2HO:.*1/.(;:F"60+;:(29K/L0;:F"/2C"&EE0/)"G88*+0;:#####M"
""# 4%)5%&+5!$+6(-&')78!9(), '5+)&'%*!: 36*(0+++;8!$+; (<-/+;#####M!
&$ 5(28*C02.*)/)"N1E)(, 00:#####M"
3$ G8895/1E=: "5(28*C02.*)/<0:(=;+0:#####$#####SS! O"
5$ NP.0;2/)"<0E(;.*2I".("Q(H0;2102."&=.J(;.*0:#####!!"
"=# >';%?'*!&0@?%;+5!A-'B%)/+;!%)5!9(36*%'&;#####!!!
=# C/(6+!(,!. (/0#####$!!
=# D<-';5'/&'())#####R
&$ @J*;C" /;.*0:#####R"
3$ G2)*20"S/;/: :102."/2C"K*:+(2C=+.#####T"
="")/*<;'()!$+*%&+5!&(!A+)5+!-"5+)&'&0E:F6-+;;'())#####T!
="""# C<66(-&'B+!4+%;<-+;#####U!
"2# >+;'&'())!$+*%&+5!&(!1'&*!"2#####$$! >!
2# .-(G'?'+5!9())5</&#####RO!
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JLAOHL!9NJ: A: !NK!L\$1!LH>!>: C"AH8!C: 2OLJ! L\$LCC4: H18!HNH@>"C9\$"4"HL1"NH8!LH>!\$: 1LJ"L1"NH!  
.\$: =: H1"NH!. NJ"9P!KN\$!LJJ!KL9OJ1P8!C1O>: H1C8!: 4. JNP: : C8!LH>!1I "\$>!. L\$1": C!!

QI +-+')%,&+-8!R1G+!. (\*'/OST!

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# \$%&'()\*%+!,(-!. ('/0!  
&\$ '()\*+,-./0102."

@("/88"; 1"4/I=2/"5())0I0"(8"&; ["60:\*I2\:"W]45&6^Z.J0"5())0I0\:"+(1 1\*. 1 02.". ("8/\*;20:."/2C"0\_=\*, "\*2"  
01 E)(, 102."/2C"0C=+/.\*(2F"/2C". ("02:=;0"+(1 E)\*/2+0"~\*.J"80C0;/)/2C":./0")/ ^ :"/2C";0I=)/.\* (2:"F"45&6"J/:"  
0:./V)\*:J0C".J\*": U<%!N66(-&<)'&08!I %-%; ; 3+)88!%)5!H()@>'; /-'3')%&'()!. (\*'/0"Wa' ()\*+, aZ\$@J\*:" ()\*+, "/EE)\*0:"  
.("/):.=C02.:F"8/+)=, F"/2C":./88"/2C" (=.)20:".J0"5())0I0\:/C1\*2\*:./.\*H0"E;( +0C=;0:"8("/CC;0:.\*2I"/)0I0C"  
:0P=/"1\*:+(2C=+."(;"/)0I0C";0./)\*.(2"8(;;0E(;.\*2I"(;.=EE(;.\*2I".J0";0E(;.\*2I"(8":0P=/"1\*:+(2C=+.\$

"

@J\*:" ()\*+, "I=;/2.00:/"E;( 1 E.F"8/\*;F"/2C\*\*1 E/;.\*"/)E;( +0: :F"=EJ()C\*2I".J0"0\_=)/"C\*12\*., ("8"/)"45&6"  
+(1 1=2\*., "101V0;:/2C"V)/2+2I".J0";\*I J.: ("8"/)"E/;. \*0:"2H()H0C\*\*2"0\*.J0; \*\*28(; 1 /) (; "8(; 1 /)I ;\*OH/2+0"  
E;( +0C=;0:\$@J0"E;( +0: :". "CO:\*I20C". ("8=8)")45&6b:")0I /)"(V)\*I /.\* (2:"\*\*2"/++(;C/2+0"~\*.J"@\*.)O"AB"(8".J0"S\*I J0;"  
NC=+/.\*(2"&102C102.: ("8"!M?R"W]@\*.)O"AB^ZF"~ J\*+J"E;( J\*V\*.: "C\*:+; \*1\*2/.\* (2" (2".J0"V/:\*:" (8":0P\*\*2"0C=+/.\*(2"  
E;( I;/1: "/2C"/+.\*H\*. \*0:c"@\*.)O"XAA"(8".J0"5"H)"<\*I J.: "&+." (8"!M>% "W]@\*.)O"XAA^ZF"~ J\*+J"E;( J\*V\*.: "OP"C\*:+; \*1\*2/.\* (2"  
\*2"01 E)(, 102.c"/2C".J0"5/1 E=: "-0P=/"X\*( )02+0"N)\*1\*2/.\* (2"&+."W]-/XN"&+.^ZF"X\*( )02+0"&I/\*2:."d (102"&+."  
W]X&d&^ZF"/2C".J0"5)0; , "&+.\$@J\*:"E()\*+, "E;\*(\*.e0:;0: ()=.\*(2"(H0;"/CHO;:/;)/)+(28;(2./.\* (2"/1 (2I".J0"  
+(1 E)\*/2/2.F".J0";0: E(2C02.F"/2C".J0"~\*.20: :0:\$@J0+(1 E)\*/2/2. \*\*: "2(;;0\_=;\*;0C". ("E;( H0".J0"/)0I /.\* (2:F"2(; "  
\*:".J0";0: E(2C02.;;0\_=;\*;0C". ("C\*:"E;( H0".J01\$"

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3\$ 45&6\*7(. \*+0"(8"7(296\*:+;\*1\*2/.\* (2" ()\*+, "  
45&6\*\*:"/2"0\_=)/"(EE(;.=2\*., "01 E)(, 0;"/2C"0C=+/. (;\$@J0+())0I0\*\*:"+(1 1\*..0C". ("+(1 E)\*/2+0"~\*.J"/))"  
/EE)\*+/V0)/ ^ : "E;( H\*C\*2I"0\_=)/"01 E)(, 102.". (EE(;.=2\*.\*0:." (/)"01 E)(, 00: "/2C"/EE)\*+/2:."~\*.J (=.;0I /;C". (f"

"

- g </+0"W\*2+)=C\*2I". ;/\*:."J\*:. (;+/) , "/: : (+/.0C"~\*.J"/;+0F":=+J"/: "J/\*;".0P.=;0"/2C"E;( .0+.\*H0"J/\*;:..),0:F"  
\*2+)=C\*2I"V;/\*C:F)(+L:F"/2C". ^ \* : :Z"
- g N.J2\*+., "
- g <0)\*I\*(2" (;;0)\*I\*( =: "+;00C"W\*2+)=C\*2I";0)\*I\*( =:"C;0: : "/2C"1; ((1\*2I"E;/+.\*+0:Z

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g ' ;0I2/2+, "  
g &I0"W%0"/2C"(H0;Z"  
g -0P=/"(;\*02./.\*(2"  
g K\*)\*./;,";H0.0;/2":./.=:"  
g A2"/CC\*.\*(2F"8(;01E)(,00:"\*2"5/)\*8(;2\*/F"=:0"(8"+/22/V\*:"(88".J0"j(V"/2C"/^ /,"8;(1".J0"^(;LE)/+0"  
g &2,"(.J0;"V/:"E;(0+.0C"V,"80C0;/)F":./0F"(")(+/"^ "(;(;C\*2/2+0"(";"0I=)/.\*(2\*\*2".J0"  
/C1\*2\*.;/.\*(2"(8\*\*.:".=C02."/C1\*:\* (2:F"01E)(,102.F"/++0:.".("E;(I;/1:F"(/C1\*2\*.;/.\*(2"(8"  
0C=+/.\*(2/"E()\*+0:"/:";0\_=";0C"V,"@\*. )0"AB"/2C\*\*.:;"0I=)/.\*(2:"

@J\*:"+(11\*.102."/EE)\*0:".("/)E0;:(2:"\*2H()H0C"\*2"5())0I0"(E0;/.\*(2:\$"@J0"5())0I0"E;(J\*V\*.:="2)/^ 8=)"  
C\*:+;\*1\*2/.\*(2"/I/\*2:."/2,"j(V"/EE)\*+/2.F"01E)(,00F"("=2E/\*C\*\*2.0;2"V,"/2,"01E)(,00"(8".J0"5())0I0F\*\*2+)=C\*2I"  
:=E0;H\*:(;"/2C"+(`(;L0;:\$@J\*:"E()\*+,"/):("/EE)\*0:".(:.=C02.:F"H02C(;F\*\*2C0E02C02."+(2.;/+.(:;"/:"`0))"/:."("

45&6"E; (J\*V\*.: "C\*:+; \*1\*2/. \*(2F"J/;/: : 1 02.F"C\*.; 0: E0+.8=) ("=2E; (80:.\* (2/)" + (2C=+. "V/:0C" (2".J0"E0;+0E. \*(2" .J/." /2, (20"J/:" /2, "(8".J0"E;0H\*(=), ")\*. .0C"+J/;/+.0;\*. \*+: "(;"":" /: : (+/.0C"~ \*.J"/"E0;: (2"~ J("J/:" (;"" : " E0;+0\*H0C"/:" J/H\*2I"/2, "(8".J (: 0"+J/;/+.0;\*. \*+: \$A2"/CC\*. \*(2F".J0"5 ())0I0"E; (J\*V\*.: ;0./)\*/. \*(2"/I/\*2: ." \*2C\*H\*C= /): " J(" ;/\*: 0"+ (1 E)/\*2.: "(8"C\*:+; \*1\*2/. \*(2" (;J/;/: : 1 02." (; " J("E/;.\*+E/.0\*\*2"~ (;LE)/+0" \*2H0:.\*I/. \*(2:\$""&))": =+J"+ (2C=+. "H\* ()/.0C"5 ())0I0"E ()+,\$""

i 2)/^ 8=)"C\*:+; \*1\*2/. \*(2"1 /, \*\*2+)=C0F"V=. \*\*: "2 (. )" \*1 \*.0C". (F"02I/I \*2I"\*2".J0"8()) (^ \*2I"V0J/H\* (;f"" ["@J;0/.02\*2I".J0"EJ, : \*+ /): /80., "(8"/2, "1 0 1 V0;"(8".J0"45&6"+(1 1 =2\*. , c" ["5;0/. \*2I"/2Ch(; "+(2.;\*V=. \*2I". (" /2"0C=+/. \*(2/)" +=). =;0".J/."\*: "J (: . \*)0". (" /2, "45&6"+(1 1 =2\*. , "1 0 1 V0;c"

5\$ <0: (=;+0:""  
45&6": "+(1 1 \*..0C". (";0:EO+. \*2I ".JO"0\_="/)C\*12\*, "(8"0H0; ; "+(1 1 =2\*, "1 0 1 V0;" /2C"/\*1 :. ("(880;";0: (=;+0:"  
/2C"(E. \*(2: ".J/. "V0208\*. ".JO"02. \*;0"5 ())0I0"+(1 1 =2\*, "\$@J: "E ()\*+, "CO./): "V(.J"(29+/1 E=: "/2C"(889+/1 E=: "  
+(28\*C02.\* /);0: (=;+0: "2"-0+. \*(2"AAA"&F": =EE (; \*HO"1 0 /; =;0: "2"-0+. \*(2"AAA"3F"/2C";0E (; . \*2I"E; (+0C=;0: "2"  
\_0+. \*(2"AAA"/++0: : \*V)0". (" /)"1 0 1 V0; ; "(8".JO"45&6"+(1 1 =2\*, "\$

""# 1'&\*+!"2!1+%3!

45&6"J/:"/EE(\*2.0C".JO"@\*. )0"AB"@0/1 F+(1 E;\*: 0C"(8".JO"8())(` \*2I"\*2C"H\*C= /)W: ZF". ("+( ( ;C\*2/.0".JO"<0+\*E\*02.\.:"  
+(1 E)\*/2+0` \* .J"80CO;/)F: ./.0F"/2C") (+ /)"\*H\*"; \*I J.: "/` : "/2C" ( ;C\*2/2+0: f""

1'&\*+!"2!9((-5')%&(-V!  
@J(1 /:"G): (2"  
.(): (2k)+/C\$0C="

M%M9T?>9>000"OP.\$"RT?"

K(-!; %,+&0!(-!; +/ <- ' &0!3%&&+-; V!  
6\*;0+. (; "(8"-/80., "[ "-0+=; \*, , "  
I\*1"d( )0, "  
j` ((0, k)+/C\$0C="

M%M9T?>9>00"OP.\$"RM>"

K(-!; &<5+) &@(@, &<5+) &!3%&&+-; V!  
60/2"(8"-.=C02. "&88/\*; ;:"  
G 1 /; "m=` /, 0C"  
(e=` /, 0Ck)+/C\$0C="

M%M9T?>9>00"OP.\$""

6\*;0+. (; "(8"-.=C02. "4\*80"[ "5(2C=+."  
X"H\*/2"G; . \*e"  
H(; . \*ek)+/C\$0C="

M%M9T?>9>00"OP.\$"R>!"

&+/C01 \*+"-==+0: : "[ "&+0: : \*V)\*. , "5((;C\*2/. (; "  
4\*: /"X\*)) /2=0H/"  
)H\*) /2=0H/k)+/C\$0C="

M%M9T?>9>00"OP.\$"R?M"

K(-!; %/ <\* &0!3%&&+-; V!  
60/2"(8"&+/C01 \*+"&88/\*; ;:"  
S(E0"< /\*)0, "  
J; /\*)0, k)+/C\$0C="

M%M9T?>9>000"OP."RT>"

5J\*08" 0(E)0"G88\*+0; "  
&I 20: "-/2+J0e"  
/ : /2+J0ek)+/C\$0C="

M%M9T?>9>00"OP.\$"RD?"

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5 ( ) 0 + . \* H 0 ) , F " . J 0 : 0 " \* 2 C \* H \* C = / ) : " / ; 0 " ; 0 : E ( 2 : \* V ) 0 " 8 ( ; " E ; ( H \* C \* 2 I " + ( 1 E ; 0 J 0 2 : \* H 0 " 2 ( 2 C \* : + ; \* 1 \* 2 / . \* ( 2 " 0 C = + / . \* ( 2 " / 2 C "

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@JO"@\*)O"AB"5((;C\*2/. (;"/+.:\*\*2C0E02C02.), "/2C"~ \*.J(=".+(28)\*+.: "(8\*\*2.0;0:." (;"V\*/:." ( ^ /;C"+(1 E)/\*2/2.: (" ;0: E (2C02.: \$"@JO"5((;C\*2/. (;" (HO;:00:"/))";0: ()=. \*(2:"=2C0;" .J\*:"E ()\*+, "/2C"02:=;0:" .J/." /))\*\*2C"H\*C=/):" \*2H()HOC\*\*2".JO"E; (+0::0:"E0;8(; 1 ".JO\*;" ;)0:"(Vj0+.\*HO), "/2C\*\*1 E/;.\* /), \$"A8", (= "J/HO"/"+(2+0;2"/V(=".V\*/:." (; + (28)\*+." (8\*\*2.0;0:."V, ".JO"@\*)O"AB"5((;C\*2/. (;"C=\*2I".JO":OP=/"1\*:+(2C=+." ;0: ()=. \*(2"E; (+0: :F"+(2./+." .JO" 45&6" ;0:\*C02.\$"A8".JO\*\*2+\*C02.\*\*2H()HO:"/))0I 0C"1\*:+(2C=+."V, ".JO"@\*)O"AB"5((;C\*2/. (;F";OE(; ."C\*;0+.), ". (.JO" 5J\*08" 0(E)0"G88\*+0;\$\$!

5\$ GH0;.\*I J."(8"A2HO:.\*I/. (;:F"60+\*:(29K/L0;:F"/2C"&EE0/)"G88\*+0;:"

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M"

@J0"-./2C/;C"

WDDDZ"RMT9>M%D"

@@n"-0;H\*+0:f"?!!"

J0/).J/CH(+/.0h:./2C/;CT"

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5\$ NP.0;2/)"<0E(;.\*2I@"Q(H0;2102."&=.J(;.\*0:"

5(2+0;2:"/V(=".J0"5())010\:"/EE)\*+/.\*(2"(8".J\*:""())\*+, "/2C"+(1E)\*2+0`\*.J"+0;./2"80C0;/)"+"H\*");\*IJ.:)/`:"

1/, "V0"/CC;0::0C". (f"

"

G88\*+0"8(;5"H\*)"<\*IJ.: "WG5<Z"i \$-\$"60E/;. 102."(8"NC=+/.\*(2"



/++0: ". (/EE; (E; /.0"; 0: (=; +0: "/2C": =EE (; . (E. \* (2: \$"@J\*": =EE (; . "1 / , "2H()H0"; 080; ; /): . (") / ` "028 (; +0 1 02. " (;  
; 0: . ; \*+ . \* (2: " (2" .J0" .J\* ; C"E / ; . , b: "/++0: ". (" + / 1 E =: " ("45&6" / + . \*H\* . \*0: \$"

dJ02" .J0"; 0: E (2C02. "": "/88") / .0C" ` \* .J" / 2 (.J0; "0C=+ / . \* (2 / ) \*\* 2: . \* . = . \* (2F" .J0"@\* .) 0" AB" 5 ( (; C\* 2 / . ( ; "1 / , "/: : \* . : . .J0"  
+ (1 E) / \* 2 / 2. "V, " + ( (; C\* 2 / . \* 2I" ` \* .J" .J0"; 0) 0H / 2. "2C\*H\*C= /): "/. " .J / . "2: . \* . = . \* (2F" 8 / +) \* . / . \* 2I" / ) 0I / . \* (2: ".J; (= I J"  
.J0\* ; "E () \* + 0: " ` J02" / EE) \* + / V) 0\$"

A8" / 2" 45&6": . = C02. " ( ; " 0 1 E) ( , 00" 02



=""# C<66(-&'B+!4+%;<-+;!)

45&6`^`\*)"(880;/2C\*\*1E)0102."/EE;(E;\*/.0"/2C";0/:(2/V)0":=EE(;.\*H0"10/:=;0:.( ".JO" /;. \*0:"=E(2"7(. \*+0"(8" /))010C"C\*:+;\*1\*2/.\*(2F"J/;/::102.F"/2Ch(;;"0./)\*.(2\$"-=EE(;.\*H0"10/:=;0:/"0"2(29C\*:+\*E)2/;;F"2(29E=2\*.H0" \*2C\*H\*C=)/"e0C":0;H\*+0:"(880;0C"/:"/EE;(E;\*/.0"/2C";0/:(2/V),"/H\*/)/V)0\$@JO,"/;0"(880;0CF"~\*.J(=".800"(" +J/;10".(".JO" /;. \*0:F".("0:.(;"0("E:0;0;H0"/++0:.".(".JO"5())010\:"0C=+/.\*(2"E;(1;/1"("/\*.\*H\*.F\*\*2+)=C\*2I" 10/:=;0:"C0:\*120C".("E;(0+.".JO":/80., "(8"/))" /;. \*0:"/2Ch(;;"JO"5())010\:"0C=+/.\*(2/)"02H";(2102."/2Ch(;;"(" C0.0;"C\*:+;\*1\*2/.\*(2F"J/;/::102.F"/2Ch(;;"0./)\*.(2\$""

@JO"&C1\*2\*.:./.(;"E;(1E.), "1/L0:"=EE(;.\*H0"10/:=;0:/"H\*/)/V)0".(".JO" /;. \*0:"=E(2";0+0\*H\*2I" 7(. \*+0hp2(`)0C10"("/\*5(1E)/\*2.\$"&.".JO".\*10".J/:"=EE(;.\*H0"10/:=;0:/"0"(880;0CF\*\*8"/5(1E)/\*2.".J/:"2(." V002"8")0CF".JO"5())010"~`\*)\*\*28(;1".JO"5(1E)/\*2/2.F\*\*2"~`;\*2IF".J/.".JO,"1/, "8\*0"/5(1E)/\*2."~`.J".JO"5())010" 0\*.JO;"/.".J/.". \*10"(";\*2".JO"8=.=;0\$@JO"&C1\*2\*.:./.(;"~`\*)"~`(;L"~`.J"/"E/;., ".("02:=;0".J/.".JO\*;"~`. \*;JO:"/;0" +(2:\*C0;0C"~`.J";0:E0+.".("/2,"E)/220C"/2C\*\*1E)0102.0C":=EE(;.\*H0"10/:=;0:\$""

@JO"5())010"~`\*)"1/\*2./\*2".JO"+(28\*C02.\*)/"., "(8".JO":=EE(;.\*H0"10/:=;0:F"E;(H\*C0C".J/."+(28\*C02.\*)/"., "C(0:" 2(. \*\*1E/\*;".JO"5())010\:"/V)\*., ".("E;(H\*C0".J(:0":=EE(;.\*H0"10/:=;0:\$"45&6"~`\*)"/+.".("02:=;0"/:"1\*2\*1 /)/2" /+/C01\*+h(++=E/.\*(2/)\*\*1E/+"(2".JO" /;. \*0:/"E(:\*V)0\$45&6"~`\*)\*\*1E)0102."10/:=;0:"\*2"/"~` /, ".J/."C(0:" 2(."=2;0/:(2/V), "V=;C02"/2, "E/;., \$"

@JO:0"/+.\*(2:"1/, \*\*2+)=COF"V=."/;0"2(.")\*1\*.0C".(f""  
" <080;;/)"( "+(=2:0)\*2IF"10C\*+/)F"/2Ch(;;"(JO;"JO/).J+;/0":0;H\*+0:"  
" <080;;/)"( ".JO"N1E)(, 00"&::\*.:/2+0" ;(1;/1"  
"

C02,F"1 (C\*8,F"(:.0;1\*2/.0".J0":=EE(;.\*H0"10/:=;0:"\*8".J0,"/;0\*\*2+(2:\*.02."`\*.J".J0"C08\*2\*.\*(2"(8":=EE(;.\*H0"10/:=;0:"\*2"q"!0>\$R"(8".J0"80C0;/)"@\*. )0"AB"<0I=)/.\*(2:\$@J0"5())0I0"~ \*)"/):("E;(H\*CO".J0" /;.\*0:"`\*.J".J0"(EE(;.=2\*.,".(:00L"/CC\*.\*(2/)1 (C\*8+/.\*(2"(:.0;1\*2/.\*(2"(8":=EE(;.\*H0"10/:=;0:"/EE)+/V)0".("J01"\*8"+\*+=1:./2+0:"+J/2I0"1/.0;\*/)), \$@J0"5())0I0".,E\*+//),";02C0;:"CO+\*:(2:"(2":=EE(;.\*H0"10/:=;0:"`\*.J\*2":0H02"W?Z"V=:\*20:."C/,:"(8";0+0\*H\*2I"/";0\_=0:."/2C"E;(H\*CO:"/"`\*.\*.02"C0.0;1\*2/.\*(2".("J0"\*1E/+0C"E/;.,W:Z"/2C".J0"&C1\*2\*.:./.(;\$"

"  
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"2# >+,')'&'();!\$+%&&+5!&(!1'&\*+!"2!

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;; L5B'; (-"r"&2,"E0;:(2"+J(:02"V,"/"E/;.,F"(:"/EE(\*2.0C"V,".J0"\*2:.\*.=\*(2F" J("1 /,"/++(1E/2,".J0"E/;.,".(("/)"100.\*2I:;0)/.0C".("J0"<0: ()=.\*(2" ;(+0:."/2C"/CH\*:0".J0"E/;.,"(2".J/."E;( +0: :\$"

"

<: L66+%!N,, /+-"r"



B: >+/'();@3%W+-"r"/2,"E0;:(2W:Z"/=.J(;\*e0C"V,".JO"@\*)0"AB"5((;C\*2/.(;"(;"CO:"I 200".("E;0:\*CO"(HO;"/2"  
\*28(;1/)"(;8(;1/)E;(+::"(=.)\*20C\*\*2".J\*:"()\*,F\*\*2+)=C\*2I"JO/;\*2I:\$"A2"E;0:\*C\*2I"(HO;\*\*28(;1/)"  
E;(+::0:F"CO+\*:(291/L0;:"1/, "8/+)\*"/.0".JO"E;(+::"^ \* .J(=";:02CO;\*2I"/"8\*2/)CO.0;1\*2/.\*2"(8"  
;0:E(2:\*V)\*,\$"Y(;".JO";)0"(8/"CO+\*:(291/L0;\*\*2"/"8(;1/)"I;\*OH/2+0"E;(+::F":00"S0/;\*2I"G88\*+0;\$"

c: >/'6\*\*)%-0!C%)/&'() "r"/+(2:0\_=02+0\*\*1 E(:OC"V,".JO"5())0I0"(2"/"<0:E(2C02."^ J(":"8(=2C".("J/HO"  
H\*()/."OC".JO"()\*)+,\$"

;D: :5</%&'()!. -(7-%3!(-!L/&'B'&0"r")(+/.\*(2:F"OH02.:F(";\*+;+=1:./2+0:"(HO;"^ J\*+J"45&6"OP0;+\*:"  
:=V:./2.\*/) +(2.;) (HO;"V(.J".JO"<0:E(2C02."/2C".JO"+(2.OP."\*2^ J\*+J"/)0I0C":OP=/"1\*:+(2C=+."\*:"  
;0E(;.0C".("J/HO"(++=;;0Cc\*\*2+)=CO:"/2,"V=\*C\*2I"(` 20C"(;"+(2.;)OC"V,"45&6F"/2C"(88\*+\*/),"  
;0+(12\*e0C"45&6":.=C02."(;1/2\*e/.\*(2:\$"

;: :36\*(0++!r"/"E0;:(2"J()C\*2I"/2,"E(:.\*2"/."45&6"8(;^ J\*+J"+(1 E02:/.\*2\*\*:";0+0\*HOC"8;(1"45&6F"  
^ \* .J(=";:0I/;C".(".)0F"+)/:.\*8\*+/.\*(2F(";:/.=:\$@J\*:".0;1\*\*2+)=CO:"/))":./88F^ JO.JO;"8=))9.\*10F"E/;.9  
.\*10F"(29+//)F"("01 E(;;/;F\*\*2+)=C\*2I"/))"8/+)=. , F^ J("/;0"8=))9.\*10"/2C"E/;.9.\*10F\*\*2+)=C\*2I"/))"  
E;(80::(;:F\*\*2:.;+=. (;:F"H\*:\*2I"/;.\*:."/2C".(JO;"01 E(, 00:".0/+J\*2I"+(=:0:\$"-.=C02."^ (;L0;:"8/))\*\*2. ("  
.J\*:"+/.0I (;, "/: "0))\$"

;<: K')%!\*>+&+-3')%&'() "r"/+(2+)=:(2"V,".JO"E;0E(2CO;/2+0"(8".JO"OH"C02+0"(8^ JO.JO;"/)0I0C"+(2C=+."  
C\*C"("C\*C"2(.H\*()/."0"E()\*,c"8\*2/)CO.0;1\*2/.\*2:"/;0";0/+JOC"(2), "8())(` \*2I"/"8(;1/)"I;\*OH/2+0"E;(+::"  
/2C".JO"+(2+)=:(2"(8"/2,"/EE0/)E;(+::"(;".JO"+)(:0"(8"/2"/EE0/)"^ \*2C(` F\*\*8"20\*.JO;"E/;.,"/EE0/):".JO"  
(=.+(10\$"

;=: K')5')7"r"&+(2+)=:(2"V,".JO":./2C/;C"(8"E;(8".J/."JO"+(2C=+."C\*C"("C\*C"2(.(++=";/:/)0I0CF"/2C"  
.JO;08(;0^ JO.JO;"\*"+(2:.\*.=.0:"/H\*()/.\*2"(8".J\*:"()\*, "W":\*\*2"/]"8\*2C\*2I"(8"8/+.^Z\$"

;B: I (;&'\*+!:)B'-( ) 3+)&! ! %-%; ; 3+)&"r"J(:.\*)0"02H\*(2102."J/;/:: 102."\*:"C08\*20C"/:"=2` 0)+(10":0P9  
V/:0C"+(2C=+."J/.F"V/:0C"(2".J0".(./)\*, "(8".J0"+\*; += 1 : ./2+0:F"\*:":=Vj0+.\*HO), "/2C"(Vj0+.\*HO), "(8802:.\*HO"  
/2C"\*:"(:.0H0;0"("EO;H/:\*HO".J/.\*")\*1\*.:("C02\*0:"/EO;:(2\:"/V)\*, ".("E/;. \*+\*E/.0"\*2"("V0208\*. "8; (1 "



=?: 1'&\*!"2!1+%3"r"/"+())0+.\*(2"(8"45&6"01E)(,00:"/2CF"~ J02"/EE;(E;\*/.0F"(=.:\*C0"+(2:=)./2.:(";  
+(2.;/+.(;:"+J;/l0C"~\*.J"=EJ()C\*2I".J\*:"" ()+, "/2C"02/+.\*2I".J0"E;( +0C=;0:"C08\*20C"~\*.J\*2\$@J0"@\*. )0"AB"  
@0/1\*\*2+)=C0:".J0"@\*. )0"AB"5((;C\*2/.(;F"C0E=., "+((;C\*2/.(;F"(l0:.()-0.5(l)0.3(/.()-0.3(; )0.4(;)-0.1 (F)0.5(



T\$ C+F<%\*!L; ;%<\*&V%!  
&2,":OP=/" /+.F\*\*2+)=C\*2I"</EOF"- (C(1 ,F"-OP=/"&::/=)." ` \*.J"/2"GVj0+.F" (;"Y(2C)\*2I"C\*;0+.0C"/1/\*2:."/2 (.JO;"  
EO;:(2F` ` \*.J(=".JO"+(2:02."(8".JO"H\*+. \*1F\*\*2+)=C\*2I\*\*2:./2+0:"` JO;0".JO"H\*+. \*1\*\*:\*2+/E/V)0"(8"I\*H\*2I"+(2:02.c"  
/): ("=2)/` 8=)" :OP=/"\*\*2.0;+(=;:0\$ ""  
!

%# \$%6+V!  
' 020.;/. \*(2F""  
` \*.J(=".JO"+(2:02."(8".JO"5(1E)/\*2/2.F"  
\*2+)=C\*2I\*\*2:./2+0:"` JO;0".JO"5(1E)/\*2/2."\*\*:\*2+/E/V)0"(8"I\*H\*2I"+(2:02."  
■ V0+/=:0"(8".JO\*;" /10" (; ""  
■ V0+/=:0"(8".JO\*;" .01E (; /; ; " (; "E0; 1 /202."1 02./) ("EJ, : \*+)\*\*2+/E/+\*., ""

?# C(5(30!  
G;/)" (; "/2/) "E020.;/. \*(2""  
G8".JO"5(1E)/\*2/2."V, ".JO"<0:E(2C02."  
d\*.J(=".JO"+(2:02."(8".JO"5(1E)/\*2/2.F""  
A2+)=C\*2I\*\*2:./2+0:"` JO;0".JO"5(1E)/\*2/2."\*\*:\*2+/E/V)0"(8"I\*H\*2I"+(2:02."  
■ V0+/=:0"(8".JO\*;" /10" (; ""  
■ V0+/=:0"(8".JO\*;" .01E (; /; ; " (; "E0; 1 /202."1 02./) ("EJ, : \*+)\*\*2+/E/+\*., ""

/# C+F<%\*!L; ;%<\*&!] '&G!%)!N?^+/&!  
<0:E(2C02.\:"=:0"(8"/2"(Vj0+." (;\*\*2:.;=1 02."  
@("=2)/` 8=),"E020.;/.0F"J( ` 0H0;";)\*I J.),F".JO"102\*./)" (; "/2/) "(E02\*2I"  
G8".JO"V(C, "(8".JO"5(1E)/\*2/2.F"  
d\*.J(=".JO"+(2:02."(8".JO"5(1E)/\*2/2.F"  
A2+)=C\*2I\*\*2:./2+0:"` JO;0".JO"5(1E)/\*2/2."\*\*:\*2+/E/V)0"(8"I\*H\*2I"+(2:02."  
■ V0+/=:0"(8".JO\*;" /10" (; ""  
■ V0+/=:0"(8".JO\*;" .01E (; /; ; " (; "E0; 1 /202."1 02./) ("EJ, : \*+)\*\*2+/E/+\*., ""

5# K()5\*\* )7W!!  
@JO". (=+J\*2I"(8".JO"E;\*H/.0"V(C, "E/; : "W;0/: :.F"V=.. (+L:F"l; (\*2I"(8".JO"5(1E)/\*2/2."V, ".JO"  
<0:E(2C02."  
G;"+/=:\*2I".JO"5(1E)/\*2/2.". (" (=+J".JO"<0:E(2C02.\:"E;\*H/.0"V(C, "E/; : "  
A2.02.\* (2/), "8 (; "/: OP=/"E=E(:0"  
d\*.J(=".JO"+(2:02."(8".JO"5(1E)/\*2/2.F\*\*2+)=C\*2I\*\*2:./2+0:"` JO;0".JO"5(1E)/\*2/2."\*\*:\*2+/E/V)0"(8"  
I\*H\*2I"+(2:02."  
■ V0+/=:0"(8".JO\*;" /10" (; ""  
■ V0+/=:0"(8".JO\*;" .01E (; /; ; " (; "E0; 1 /202."1 02./) \*\*2+/E/+\*., " (; "EJ, : \*+)\*\*2+/E/+\*., \$!

+# ") /+; &V!  
7(2"8(;+\*V)0":OP=/"\*\*2.0;+(=;:0"V0. ` 002"E0;:(2:"` J("/;0";0)/.0C".("0/+J"(.JO;"

!%13%+!, 2G+0+.+0! 2. !+!0/./!.&U20!G\*/7!.%2!VW5!X0G/\*7!\$\*+72!028/\*+.OK!PX\$OR! 9'.27!12\*F&.+7:IM356M!%&'!)F'.+.) .2, !\$/784&+0&0.!  
G/\*!S1+. +7IT!%&'! 27/12, !\*2G2\*20-2'!. /!%+ J%2'!.%\*/ )K%/).!!&0, !%&'!, 2G+02, !S8\*+1&.2!F/, 9!8&\*.':T!3%2' 2!&\*2!4F2\*. +2' !M356M!.%+OU'!







- ' ; (: . \* . = . \* 21 " / 2 ( . J 0 ; " E 0 ; : ( 2 "
- N 2 I / I \* 2 I \* 2 " : O P = / ) / + . \* H \* . , " ^ \* . J " / 2 ( . J 0 ; " E 0 ; : ( 2 " ^ J ) 0 " L 2 ( ^ \* 2 I ) , " \* 2 8 0 + . 0 C " ^ \* . J " J = 1 / 2 " \* 1 1 = 2 ( C 0 8 \* + \* 0 2 + , " H \* ; = : " W S A X Z " ( ; / " : O P = / ) , " . ; / 2 : 1 \* . . 0 C " C \* : 0 / : 0 " W - @ 6 Z " ( ; \* \* 2 8 0 + . \* ( 2 " W - @ A Z F " ^ \* . J ( = . " \* 2 8 ( ; 1 \* 2 I " . J 0 ( . J 0 ; " E 0 ; : ( 2 " ( 8 " . J 0 " H \* ; = : F " C \* : 0 / : 0 F " ( ; \* \* 2 8 0 + . \* ( 2 "
- 5 / = : \* 2 I " ( ; / . . 0 1 E . \* 2 I " . ( " + / = : 0 " . J 0 \* \* 2 + / E / + \* . / . \* ( 2 " ( 8 " / 2 ( . J 0 ; " E 0 ; : ( 2 " W . J ; ( = I J " / ) + ( J ) F " C ; = I : F " ( ; " / 2 , " ( . J 0 ; " 1 0 / 2 : 7 8 ( ; " . J 0 " E = ; E ( : 0 " ( 8 " + ( 1 E ; ( 1 \* : \* 2 I " . J / . " E 0 ; : ( 2 " \ : " / V \* ) \* . , " . ( " I \* H 0 " + ( 2 : 0 2 . " ( " : O P = / ) / + . \* H \* . , F " ( ; " 8 ( ; " . J 0 " E = ; E ( : 0 " ( 8 " 1 / L \* 2 I " . J / . " E 0 ; : ( 2 " H = ) 2 0 ; / V ) 0 " . ( " 2 ( 2 9 + ( 2 : 0 2 : = / ) " : O P = / ) / + . \* H \* . , "
- K \* : / E E ; ( E ; \* / . \* ( 2 " ( 8 " / 2 ( . J 0 ; " E 0 ; : ( 2 \ : " \* C 0 2 . \* . , " ( 2 " / E E : F " ^ 0 V : \* . 0 : F " ( ; ( . J 0 ; " H 0 2 = 0 : " C 0 : \* I 2 0 C " 8 ( ; " C / . \* 2 I " ( ; " : O P = / ) + ( 2 2 0 + . \* ( 2 : " W O \$ I \$ F " : E ( ( 8 \* 2 I Z "
- Y ( ; + \* 2 I " / " E 0 ; : ( 2 " . ( " . / L 0 " / 2 " / + . \* ( 2 " / I / \* 2 : . " . J / . " E 0 ; : ( 2 " \ : " ^ \* ) " V , " . J ; 0 / . 0 2 \* 2 I " . ( " : J ( ^ F " E ( : . F " ( ; " : J / ; 0 " \* 2 8 ( ; 1 / . \* ( 2 F " H \* C 0 ( F " / = C \* ( F " ( ; " / 2 \* \* 1 / I 0 " . J / . " C O E \* + . : " . J 0 " E 0 ; : ( 2 " \ : " 2 = C \* . , " ( ; " : O P = / ) / + . \* H \* . , "
- p 2 ( ^ \* 2 I ) , " : ( ) \* + . \* 2 I " / " 1 \* 2 ( ; " 8 ( ; " : O P = / ) / + . \* H \* . , "
- N 2 I / I \* 2 I \* 2 " : O P " . ; / 8 8 \* + L \* 2 I "
- p 2 ( ^ \* 2 I ) , " + ; 0 / . \* 2 I F " E ( : : 0 : : \* 2 I F " ( ; " C \* : : 0 1 \* 2 / . \* 2 I " + J \* ) C " : O P = / ) / V = : 0 " \* 1 / I 0 : " ( ; " : 0 + ( ; C \* 2 I : "
- 5 ; 0 / . \* 2 I " ( ; " C \* : : 0 1 \* 2 / . \* 2 I " : , 2 . J 0 . \* + " 1 0 C \* / F \* \* 2 + ) = C \* 2 I \* \* 1 / I 0 : F " H \* C 0 ( : F " ( ; " / = C \* ( " : O E ; 0 : 0 2 . / . \* ( 2 : " ( 8 " \* 2 C \* H \* C = / ) : " C ( \* 2 I " ( ; " : / , \* 2 I " : O P = / ) , 9 ; 0 ) / . 0 C " . J \* 2 I : . " . J / . " 2 0 H 0 ; " J / E E 0 2 0 C F " ( ; " E ) / + \* 2 I \* \* C 0 2 . \* 8 \* / V ) 0 " ; 0 / ) E 0 ( E ) 0 \* \* 2 8 \* . \* \* ( = : " E ( ; 2 ( I ; / E J \* + " ( ; " 2 = C 0 " : \* . = / . \* ( 2 : " ^ \* . J ( = . " . J 0 \* ; + ( 2 : 0 2 . " W \$ O \$ F " 6 0 0 E 8 / L 0 : Z "
- 5 ; 0 / . \* 2 I " ( ; " C \* : : 0 1 \* 2 / . \* 2 I \* \* 1 / I 0 : " ( ; " H \* C 0 ( : " ( 8 " + J \* ) C " : O P = / ) / V = : 0 " 1 / . 0 ; \* / ) "

N\$ N&G+-!. -(G'?&+5!9()5</&"

!\$ [<\*\*0')7V!'"]

- " <0E0/.0C"/2Ch(;":0H0;0"/II;0::\*H0"VOJ/H\*(;""
- " @J/."\*:"L0),".(\*\*2.\*1\*C/.0\*(;\*2.02.\*(2/)), "J=;.F"+(2.;)F("EJ, :\*+//), "(;"1 02./), "C\*1\*2\*:J".JO"5(1E)/\*2/2.F""

- $\frac{d}{dt} \left( \frac{1}{2} m v^2 \right) = \mathbf{F} \cdot \mathbf{v}$  (Power)
- $\frac{d}{dt} \left( \frac{1}{2} m v^2 + mgh \right) = \mathbf{F} \cdot \mathbf{v}$  (Mechanical Energy)

Work-Energy Theorem

$$W = \int \mathbf{F} \cdot d\mathbf{r} = \Delta K = \frac{1}{2} m v_f^2 - \frac{1}{2} m v_i^2$$

K# 9();+) &&K(-/+8!%)5!)/%6%/'&%&'()!>+,)'&'();!  
&:"=:0C\*\*2".J\*:" ( )\*,F".JO"8())( ^ \*2I"C08\*2\*.(2:"/2C"=2C0;:./2C\*2I: "/EE), f!

YT 9();+)&!

5(2:02. \*\*: "/2"/88\*; 1/. \*HOF"+(2: +\*(=:"F"/2C"H()=2./; , "/I;00102. ". ("02I/I0\*\*2"/I;00C"=E(2"8(; 1: "(8":OP=/"  
+(2./+.\$"&"E0;:(2"+/22(. "I"H0"+(2:02. \*\*8".JO"E0;:(2\*\*:"=2C0;" .JO"/10"(8"+(2:02. "8(;":OP=/" )+(2./+."F".JO"  
E0;:(2\*\*:"COHO)(E 102./), "(; \*\*2.0)0+. =/), "C\*:/V)OCF" (; .JO"E0;:(2\*\*:"102./), \*\*2+/E/+\*./ .0C" (; "EJ, : \*+/), "  
JO)E)0: :\$4/+L"(8"E; (.0: ." (;":0: \*:/2+0"/+22(. "V0\*\*2.0;E;0.0C"/: "+(2:02.\$^-)02+0"/+22(. "V0\*\*2.0;E;0.0C"/: "  
+(2:02.\$^5(2:02. "1 =. "V0"(2I (\*2I".J; (=IJ (=." /2, ":OP=/" )+(2./+." /2C"+/2"V0";OH(LOC"/. "/2, ". \*10\$"  
@JO"OP\*:.02+0"(8"/C/. \*2I";0)/. \*(2:J\*EFC(10: . \*+ "E/;.20;:J\*E" (; "1 /; ;\*/I0"V0. ` 002".JO"E0;:(2: \*\*2H()HO CF" (; "  
.JO"OP\*:.02+0"(8"E/;. ":OP=/" )0)/. \*(2:"V0. ` 002".JO"E0;:(2: \*\*2H()HO CF\*\*:"20HO;"V, \*\*.:0)8"/2\*\*2C\*+/. (; "(8"  
+(2:02.\$"  
"

A2C\*H\*C=): "1 /, "E0;+0\*H0"/2C"OPE0;\*02+0".JO: /10\*\*2.0;/+.\* (2\*\*2C\*880;02."` /, :\$@JO;08(;OF\*\*." :.JO"  
;0:E(2:\*V)\*, "(8"0/+J"E/;. , . ("CO.0;1\*20".J/." .JO"(.JO;J/:"+(2:02.0C"V08(;0"02I/I\*2I\*\*2".JO"/+.\*H", \$"  
"

A8"+(2:02. \*\*: "2(. +)0/;), "E; (H\*COC"E;\*(;". ("02I/I\*2I\*\*2".JO"/+.\*H", F+(2:02. "1 /, "V0"/. \*8\*0C"V, "` (;C" (; "  
/+.\* (2"/.": (10"E(\*2."C=\*2I".JO\*\*2.0;/+.\* (2" (; .JO;0/8.0;F"V=".)0/; +(1 1=2\*+/. \*(2"8; (1".JO" (=.:0. \*\*: "  
:.;(2I), "02+(=;/I0C\$Y(;+(2:02. ". ("V0"H/)\*CF".JO;0"1 =. "V0"/+ )0/;"OPE;0: \*(2\*\*2)^ ( ;C: "(;"/+.\* (2: ".J/." .JO"  
(.JO; \*\*2C\*H\*C=/" )+(2:02.0C". ("J/." :E0+\*8+":OP=/" )+(2C=+.\$^5(2:02. \*\*: "OH/)=/.0C"8; (1".JO"E0;:E0+. \*H0"(8"  
` J/." /;0/:(2/V)0"E0;:(2` (=)C"+(2+)=C0"/;0"1 =.=/), "=2C0;:./2C/V)0" ` ( ;C: "(;"/+.\* (2:\$^<0/:(2/V)0"  
;0+\*E;(+/. \*(2"+/2"0: ./V)\*:J+(2:02.\$^Y(; "OP/1E)OF\*\*8": (10(20"L\*: :0: ", (=F", (= "+/2"L\*: :.JO1 "V/+L" W"8", (= "  
` /2. ".(Z" ` \*J(=. ".JO"200C". ("OPE)\*+.), "(V./\*2", (= "

:./2I=)/.\*(2F("(.JO;"EJ,:\*+/)";(=I J20:="C=;\*2I"(.JO;`^\*:0+(2:02:=/)"OPF".J(:0"/+.:1/,+(2:.\*=.0"  
C/.\*2I"H\*(02+0"(:;OP=)//:/=).\$ "

ZT K(-/+!

Y(+0\*\*:".JO"=:0"(8"EJ,:\*+/)H\*(02+0)/2Ch(;EJ,:\*+/)1E(:.\*(2".(I/\*2":OP=)/+/+0:.\$"-OP=)/+.\*H\*,".J/."\*:"  
8(+0C\*\*:"F"V,"C08\*2\*.\*(2F"2(29+(2:02:=/)"F"V="2(29+(2:02:=/)"OP=)/+.\*H\*,"\*:"2(."20+0:./;\*),8(+0C\$Y(+0"  
\*:"+(2C=+."J/.F\*\*8":=88\*+02.),":OH0;OF"+/2"201/.0"+(2:02.\$"

Y(+0"/):(\*2+)=C0:".J;0/..F\*\*2.\*1\*C/.\*(2"W"1E)\*OC".J;0/..ZF"/2C"+(0;+(2".J/."\*:"2.02C0C".("HO;+(10"  
;0:\*.:/2+0"("E;(C=+0"+(2:02."W0\$I\$F"]S/HO":OP`^".J"10"("A))"J\*.",(=F^`J\*+J"0)\*\*:".JO";0:E(2:OF"]GL/,F"  
C(2\."J\*."10\$A))"C("`J/.",(="`/2.\$^Z\$""

5(0;+(2\*\*:"=2;0/(2/V)0"E;0::=;0"8(:;OP=)/+.\*H\*.,\$5(0;+\*HO"+(2C=+.F\*\*8":=88\*+02.),":OH0;OF"+/2";02C0;"/"  
E0;:(2\:"+(2:02.\*\*20880+.\*HOF"VO+/=:0\*\*."\*:"2(."H(=2./;,\$"dJ02":(10(20"1/L0:"+)0/;".J/.".JO,"C("2(."  
`/2".("02I/10\*\*2":OP=)/+.\*H\*.,F".J/.".JO,"`/2".(":(EF(";.J/.".JO,"C("2(."`/2".("I("E/:."/"0;./\*2"  
E(\*2".(8":OP=)"\*2.0;/+.\*(2F"+(2.\*2=0C"E;0::=;0"V0,(2C".J/"E(\*2."+/2"V0"+(0;+\*HO\$5(0;+\*(2\*\*:"OH/)=/.0C"  
V/:0C"(2".JO"8;0\_=02+,F\*\*2.02:\*,F\*\*:()/.\*(2F"/2C"C=;/.\*(2"(8".JO"E;0::=;0\*\*2H()HOC\$""

!  
eT ")/%6%/'&%&'(!

A2+/E/+\*./.\*(2\*\*:"/":./0`^ JO;0"/"EO;:(2\*\*:"2+/E/V)0"(8"I\*H\*2I"+(2:02.\$"&2\*\*2+/E/+\*./0C"EO;:(2"+/22(."  
1/L0"/;.\*(2/)F"/0:(2/V)0"C0+\*:(2:"VO+/=:0".JO,")+/L".JO"+/E/+\*.,".("I\*H0"L2(`2Ih\*28(;10C"+(2:02."  
W0\$I\$F".(="2C0;:/2C".JO"]`J(F`^ J/.F`^ JO2F`^ JO;OF`^ J,F"/2C"J(`^"(8".JO\*;"OP=)"\*2.0;/+.\*(2Z\$&"EO;:(2"  
+/22(."+(2:02.\*\*8".JO,"/;0"=2/V)0".(="2C0;:/2C`^ J/."\*:"J/EE02\*2I"(";/;0"C\*:(;02.0CF"JO)E)0:;F/;)00EF"(";  
=2+(2:+\*(="8(";/2,;0/:(2F\*\*2+)=C\*2I"VO+/=:0"(8"/)+(J()("(.JO;"C;=I"+(2:=1E.\*(2\$""

@J\*:"()\*+,"/):(+(HO;:"/"EO;:(2`^ J(:0\*\*2+/E/+\*.,";0:=):"8;(1"/.01E(/;,"("EO;1/202."EJ,:\*+/)(";  
102./)"JO/).J"+(2C\*.\*(2F\*\*2H(=2./;,"EJ,:\*+/)";0:./;/\*2.F"/2Ch(;".JO"+(2:=1E.\*(2"(8\*\*2+/E/+\*./.\*2I"  
:=V:./2+0:\$"





"  
="""# L3)+;&0!

@J0"45&6"+(1 1=2\*. , "02+(=;/10:".JO";0E(; . \*2I"(8"1\*:+(2C=+." /2C"+;\*10:"V, "5(1E)/\*2/2.: "/2C`^ \*.20::0:\$"  
-(10.\*10:F"5(1E)/\*2/2.:(" ;` \*.20::0:"/;0"JO:\*/2.". ("I\*H0"7(. \*+0". ("5())0I0"(88\*+\*/):(" ;E/;. \*+\*E/.0""2"  
<0: ()=. \*(2"E; (+0::0:"V0+/=:0".JO, "80/;. J/.".JO, ".JO1:0)H0:"1 /, "V0"\*2"H\* ()/. \*(2"(8"+0;./ \*2")/` :(" ;(.JO;"45&6"  
E()\*+0:F"=+J"/:"=2C0;/10"C;\*2L\*2I"(" ;="0"(8"\*)\*+."C;=I:"/.".JO". \*10"(8".JO"\*2+\*C02.\$"<0:E(2C02.: "1 /, "JO:\*/.0"  
."V0"8(;.J+(1 \*2I"C=;\*2I".JO"E; (+0::"8(;".JO":/10";0/:(2:\$"  
"

A.": "\*"2".JO"V0: ."\*2.0;0:."(8".JO"5())0I0"+(1 1=2\*. , ".J/."5(1E)/\*2/2.: "+J((:0". ("I\*H0"7(. \*+0"(8"1\*:+(2C=+." ("5())0I0"(88\*+\*/):F".J/."` \*.20::0:"+(10"8(;` /;C". ("J/;0` J/.".JO, "L2(` F"/2C".J/."/)"" /;. \*0:"V0"8(;.J+(1 \*2I" C=;\*2I".JO"E; (+0::)\$"  
"

@("02+(=;/10";0E(; . \*2I"/2C"E/;. \*+\*E/.\*(2""2".JO"E; (+0::F".JO"5())0I0"1/\*2./ \*2:"/'" ()\*+, "(8"(880;\*2I"" /;. \*0:"/2C"





22""# \$+B';'()!(,!&G';!. ('/0!!

@J\*:" ()\*+, " : =++00C:"E;0H\*(="E()\*+\*0:"/CC;0::\*2|"C\*:+;\*1\*2/.\*(2F"J;/;/:: 1 02.F":0P=/"1\*:+(2C=+.F"/2Ch(;"

\$: CNJO1"NH!. \$N9: CC!KN\$!LJJ: A: >!="NJL1"NHC!NK!. NJ"9P!NH!: \OLJ!N. . N\$1OH"1P8! L\$LCC4: H18!LH>!  
HNH>"C9\$"4"HL1"NH!0I +-+'%)&+!&G+!R\$+; (\*&'()!. -(/+;;ST!

"  
"

A\$ \$+; (\*&'()!. -(/+;;!NB+-B'+] "  
@J0"5()010"~ \*)"/+."(2"/2, "7(.+0F"5(1 E)/\*2.F(";p2(`)0CI 0"(8"/"

^\*))"V0";080;;0C". ("J0"/EE; (E;\*/.0"5 ())010"(88\*+0"8(;";0: ()=. \*(2F"(";". (/2 (.J0;"/EE; (E;\*/.0" ^2: .\*. =. \*(2"(";")/ ^ "028(;+0102."/102+, \$"

" G880;\*2I"/2C"+ ((;C\*2/. \*2I":=EE (; \*H0"10/;=;0:"8(;". J0"5 (1 E)/\*2/2.\$""

" G880;\*2I"/2C"+ ((;C\*2/. \*2I":=EE (; \*H0"10/;=;0:"8(;". J0"<0: E (2C02.F"/:/EE)\*+/V)0\$"

" 7 (. \*8, \*2I". J0"5 (1 E)/\*2/2.F" (;". J0"E0;: (2" J (";0E (; .0C". J0"/))01 / . \*(2W:ZF" (8". J0"E (: : \*V)0";0: ()=. \*(2" E; (+0::0:F\*\*2+)=C\*2I"/":=EE (; \*H0"/2C";010C\*/);0: E (2:0F"/2"Λ28(; 1 /)"<0: ()=. \*(2" (E. \*(2F" (;". J0" <0: ()=. \*(2" ; (+0::"C0:+; \*VOC"V0) (^ \$"

" 60.0; 1\*2\*2I" ^ J0.J0;". J0"5 (1 E)/\*2/2. " ^ \*: J0:". ("1/L0"/"5 (1 E)/\*2.\$"

" 7 (. \*8, \*2I". J0"/))E/; . \*0:F\*\*2+)=C\*2I". J0"<0: E (2C02."/2C"5 (1 E)/\*2/2.F" (8". J0";0: ()=. \*(2"E; (+0::0:F" \*2+)=C\*2I"/":=EE (; \*H0"/2C";010C\*/);0: E (2:0F"/2"Λ28(; 1 /)"<0: ()=. \*(2" (E. \*(2F" (;". J0"<0: ()=. \*(2" ; (+0::" C0:+; \*VOC"V0) (^ F\*\*8"/"5 (1 E)/\*2. "": "1 /CO\$"

" 7 (. \*8, \*2I"/))E/; . \*0:"(8". J0\*;";IJ.: " ^ \*.J\*2". J0"<0: ()=. \*(2" ; (+0::"=2C0;". J\*: " )\*+, \$"

#\$%&'(!\*!+, - &%\*' (\* (!., !/(0\$12. \* (0!3&.'. , (2!

A8". J0"5 (1 E)/\*2/2. \*\*2C+/.0: ". J0, " ^ \*: J". ("\*2\* ./.0"/"5 (1 E)/\*2. "W2"/"1 /220;". J/. "+/2";0/: (2/V), "V0"+(2: .;=0C" /: ";08)0+. \*2I" \*2.02.". ("1/L0"/"5 (1 E)/\*2.F" ^ J0.J0;(";/)), (";\*2" ^ ; \*2IZF". J0"&C1\*2\*.: /.(; " ^ \*)" J0)E". ("8/+)\* ./.0" .J0"5 (1 E)/\*2.F" ^ J\*+J" ^ \*)\*\*2+)=C0F"

" d (;L\*2I" ^ \*.J". J0"5 (1 E)/\*2/2. ("C0.0; 1\*20" ^ J0.J0;". J0"5 (1 E)/\*2/2. " ^ \*: J0:". ("E

02: =; 0"0\_ =/) / + + 0: : " ` \* . J (= . " \* 2 \* . / . \* 21 " / " 5 (1 E) / \* 2 . \$ @ J0 " & C 1 \* 2 \* : . ; / . ( ; " ` \* ) + ( 2 : \* C0 ; " . J0 " 8 ( ) ) ( ^ \* 21 " 2 ( 29  
OPJ / = : . \* H0 " 8 / + . ( ; : . ( " C0 . 0 ; 1 \* 20 " ` J0 . J0 ; " . ( 8 ) 0 " / " 5 (1 E) / \* 2 . F "

" @ J0 " 5 (1 E) / \* 2 / 2 . \ : " ; 0 \_ = 0 : . " 2 ( . ( " E ; ( + 00 C " ` \* . J " \* 2 \* . / . \* ( 2 " ( 8 " / " 5 (1 E) / \* 2 . c "  
" @ J0 " 5 (1 E) / \* 2 / 2 . \ : " ; 0 / : ( 2 / V ) 0 " : / 80 . , + ( 2 + 0 ; 2 : " ; 01 / ; C \* 21 " \* 2 \* . / . \* ( 2 " ( 8 " / " 5 (1 E) / \* 2 . c "  
" @ J0 " ; \* : L " . J / . / C C \* . ( 2 / ) / + . : " ( 8 " C \* : + ; \* 1 \* 2 / . \* ( 2 " ` ( = ) C " ( + + = ; " \* 8 " / " 5 (1 E) / \* 2 . " \* : " 2 ( . " \* 2 \* . / . 0 C c "  
" @ J0 " : 0 H0 ; \* : , " ( 8 " . J0 " / ) ) 01 0 C " C \* : + ; \* 1 \* 2 / . \* ( 2 F " \* 2 + ) = C \* 21 " ` J0 . J0 ; " . J0 " C \* : + ; \* 1 \* 2 / . \* ( 2 F " \* 8 " 0 : . / V ) \* : J0 C F " ` ( = ) C "  
; 0 \_ = \* ; 0 " . J0 " ; 01 ( H / ) " ( 8 " / " < 0 : E ( 2 C02 . " 8 ; ( 1 " + / 1 E = : ( ; " \* 1 E ( : \* . \* ( 2 " ( 8 " / 2 ( . J0 ; " C \* : + \* E ) \* 2 / ; " : / 2 + . \* ( 2 " . ( "  
02 C " . J0 " C \* : + ; \* 1 \* 2 / . \* ( 2 " / 2 C " E ; 0 H02 . " \* : " ; 0 + = ; ; 02 + 0 c "  
" @ J0 " / 10 " / 2 C " ; 0 ) / . \* ( 2 : J " E " ( 8 " . J0 " / ; \* 0 : F " \* 2 + ) = C \* 21 " ` J0 . J0 ; " . J0 " < 0 : E ( 2 C02 . " \* : " / " 5 ( ) ) 01 0 " 01 E ) ( , 00 c "  
" @ J0 " : + ( E0 " ( 8 " . J0 " / ) ) 01 0 C " C \* : + ; \* 1 \* 2 / . \* ( 2 F " \* 2 + ) = C \* 21 " \* 2 8 ( ; 1 / . \* ( 2 " : = 11 0 : . \* 21 " / " E / . . 0 ; 2 F " ( 21 ( \* 21 "  
C \* : + ; \* 1 \* 2 / . \* ( 2 F " ( ; " C \* : + ; \* 1 \* 2 / . \* ( 2 " / ) ) 01 0 C " . ( " J / H0 " \* 1 E / + . 0 C " 1 = ) . \* E ) 0 " \* 2 C " H \* C = / ) : c "  
" @ J0 " / H \* ) / V " \* . , " ( 8 " 0 H " C02 + 0 " . ( " / : : \* : " / " 60 + \* : ( 291 / L0 ; " \* 2 " C0 . 0 ; 1 \* 2 \* 21 " ` J0 . J0 ; " C \* : + ; \* 1 \* 2 / . \* ( 2 " ( + + = ; ; 0 C c "  
" d J0 . J0 ; " . J0 " 5 ( ) ) 01 0 + ( = ) C " 02 C " . J0 " / ) ) 01 0 C " C \* : + ; \* 1 \* 2 / . \* ( 2 " / 2 C " E ; 0 H02 . " \* : " ; 0 + = ; ; 02 + 0 " ` \* . J (= . " \* 2 \* . / . \* 21 "  
\* : " ; 0 : ) = . \* ( 2 " E ; ( + 0 : : \$ "

A8 " C00 1 0 C " 20 + 0 : : / ; , F " . J0 " & C 1 \* 2 \* : . ; / . ( ; " 1 / , + ( 2 : = ) . " ` \* . J " / E E ; ( E ; / . 0 " 5 ( ) ) 01 0 " 01 E ) ( , 00 : F " / 2 C h ( ; + ( 2 C = + . " / "  
H \* ( ) 02 + 0 " ; \* : L " / : : 0 : : 1 02 . " . ( " / " C " . J0 " ; " C0 . 0 ; 1 \* 2 / . \* ( 2 " ` J0 . J0 ; " . ( " \* 2 \* . / . 0 " / " 5 (1 E) / \* 2 . \$ "

d J02 " . J0 " & C 1 \* 2 \* : . ; / . ( ; " \* 2 \* . / . 0 : " / " 5 (1 E) / \* 2 . F " . J0 , " C ( 2 ( . " V0 + ( 1 0 " . J0 " 5 (1 E) / \* 2 / 2 . \$ @ J0 " 5 (1 E) / \* 2 / 2 . " \* : " . J0 "  
E0 ; ( 2 " ` J ( " OPE0 ; \* 02 + 0 C " . J0 " / ) ) 01 0 C " + ( 2 C = + . " J / . " + ( = ) C " + ( 2 : . \* . = . 0 " / " H \* ( ) / . \* ( 2 " ( 8 " . J \* : " " ( ) + , \$ "

X\$ > ; 3 ; : ; % \* \*  
@ J0 " 5 ( ) ) 01 0 " 3 % 0 " C \* : 1 \* : : " / " 5 (1 E) / \* 2 . " \* 8 F " / . / 2 , " . \* 1 0 " C = ; \* 21 " . J0 " \* 2 H0 : . \* 1 / . \* ( 2 " ( ; " < 0 : ( ) = . \* ( 2 " " ; ( + 0 : : F " ( 20 " ( ; "  
1 ( ; 0 " ( 8 " . J0 " 8 ( ) ) ( ^ \* 21 " I ; ( = 2 C : " / ; 0 " 1 0 . F "

I Z @ J0 " 5 ( ) ) 01 0 " \* : " = 2 / V ) 0 " . ( " \* C02 . \* 8 , " . J0 " < 0 : E ( 2 C02 . " / 8 . 0 ; " . / L \* 21 " ; 0 / : ( 2 / V ) 0 " : . 0 E : " . ( " C ( : ( "  
R Z @ J0 " 5 ( ) ) 01 0 " 2 ( " ) ( 21 0 ; " 02 ; ( ) ) : " ( ; " 01 E ) ( , : " . J0 " < 0 : E ( 2 C02 . "  
T Z & " 5 (1 E) / \* 2 / 2 . " H ( ) = 2 . / ; \* ) , " ` \* . J C ; / ` : / 2 , " ( ; " / ) " ( 8 " . J0 " / ) ) 01 / . \* ( 2 : " \* 2 " . J0 " 5 (1 E) / \* 2 . F " / 2 C " . J0 "  
& C 1 \* 2 \* : . ; / . ( ; " C0 + ) \* 20 : " . ( " \* 2 \* . / . 0 " / " 5 (1 E) / \* 2 . "  
% Z @ J0 " 5 ( ) ) 01 0 " C0 . 0 ; 1 \* 20 : " . J0 " + ( 2 C = + . " / ) ) 01 0 C " \* 2 " . J0 " 5 (1 E) / \* 2 . " ` ( = ) C " 2 ( . " + ( 2 : . \* . = . 0 " / " " ( ) \* + , " H \* ( ) / . \* ( 2 F " \* 8 "  
E ; ( H02 "

& " 60 + \* : ( 291 / L0 ; " + / 2 " ; 0 + ( 1 1 02 C " C \* : 1 \* : : / ) " . ( " . J0 " & C 1 \* 2 \* : . ; / . ( ; F " \* 8 " . J0 , " V0 ) \* 0 H0 " . J0 " I ; ( = 2 C : " / ; 0 " 1 0 . \$ "&

"  
@J0"&C1\*2\*.:./.(;"~ \*)"2(. \*8, ".JO"" /; . \*0:"(8"/2, "/EE0/)"(8".JO"C\*: 1\*.:./)\$"A8F"J( ^ OH0;F".JO"5(1E)/\*2/2."/EE0/):F"  
V=".JO"<0:E(2C02." ^ /:"2(. \*8\*0C"(8".JO"5(1E)/2.F".JO"&C1\*2\*.:./.(;"1=:. ".JO2"E;(H\*CO".JO"<0:E(2C02."  
`\*.J"/"7GA&"/2C"~ \*)"2(. \*8, ".JO"<0:E(2C02."(8".JO"5(1E)/\*2/2.\:"/EE0/)"` \*.J"/2"(EE(;.=2\*., ".(;"0:E(2C\$"  
"

@J;(=IJ(=".JO"C\*: 1\*.:./)/EE0/)"E;( +0: :F".JO"5())0I0"~ \*)F""  
"

" A1E)0102."C\*: 1\*.:./)/EE0/)"E;( +0C=;0:"0\_=/), "8(;".JO"" /; . \*0:c"  
" &:.\*I2"/".; /\*20C"6\*: 1\*.:./)"&EE0/)"G88\*+0;" ^ J("C\*C"2(. ./L0"E/; ."2"/2"\*2HO:.\*I/. \*(2"(8".JO"/))0I/. \*(2:"(;"  
C\*: 1\*.:./)"(8".JO"5(1E)/\*2.c"  
" ' ;(H\*CO".JO"" /; . \*0:"/"0/:(2/V)0"/2C"0\_=/)"(EE(;.=2\*., ".("1/L0"/":./0102."\*2":=EE(;."(8F"(;"  
+J/))02I\*2IF".JO"C\*: 1\*.:./)c"/2C"  
" 7(. \*8, ".JO"" /; . \*0:"(8".JO";0:=)."(8".JO"/EE0/)" /2C".JO";/. \*(2/0"8(;".JO";0:=).\$"  
"

@J0"l ;(=2C:"8(; "C\*: 1\*.:./)/EE0/):"/;0)"\*1\*.0C".(f"  
!Z ' ;(+0C=;/)"\*;;0I=)/;\*, ".J/." ^ (=)C"+J/2I0".JO"(=.(10c"  
RZ

@J0"6\*: 1\*::/)"&EE0/)G88\*+0;"1 /, "+(2:=).` \* .J".J0"&C 1\*2\*: .;/.(;" /2Ch(;"01 /)"(=2:0)"(2" \_=0:.(2:"(8"  
E;(+0C=;0"(";" /.\*(2/)0"8(;" +);\*8\*+/.\*(2F\*\*8"200C0C\$@J0"&C 1\*2\*: .;/.(;" ^)")"1 /2./2"C(+= 1 02./.\*(2"(8"/))":=+J"  
+(2:=)./.\*(2\$"  
"

XAA\$ : 3+-7+)/0!\$+3(B%\*E")&+-'3!C<;6+);'()!(,;!%!C&<5+)&"

@J0"5())010"1 /, ""2\*./0"010;I02+, ";01 (H/) "(8"/":.=C02."/++=:0C"(8"-0P"6\*:+;\*1\*2/.\*(2"(-0P9V/:0C"  
S;/::: 1 02."=E(2";0+0\*E."(8"7(.+0hp2(`)0C10F"/"5(1 E)/2.F"(" /." /2, ".\*1 0"C=;\*2I".J0";0: )=.\*(2"E;( +0:.\$"  
' ;\*(;"( /2"010;I02+, ";01 (H/)F".J0"5())010` ^)")+(2C=+."/2\*\*2C\*H\*C=/)e0C";:L"/::0:: 1 02."/2C"1 /, ";01 (H0"  
.J0":.=C02.\*\*8".J/." /::0:: 1 02."C0.0; 1\*20:".J/." /2\*\*1 1\*202."/2C":0;\*(=" .J;0/.".(" .J0"J0/).J"(" ;:/80., "(8"/"  
5(1 E)/2/2."(;"/2, ".=C02.:F"01 E)(, 00:F"("(.J0;"E0;:(2:" /;\*:\*2I"8; (1".J0"/))01 /.\*(2:"(8":0P"C\*:\*1\*2/.\*(2"  
j=:.\*8\*0":=+J"/+.\*(2\$"-.=C02.: /++=:0C"(8"(.J0;"8( ;1:"(8"C\*:\*1\*2/.\*(2"W2(.:OPZ"/;0":=Vj0+.". ("\*2.0;\*1 "  
:=:E02:\*(2F` J\*+J"+/2"V0\*\*1 E(:0C"8(;" /80., ";0/: (2:\$"  
"

dJ02"/2"010;I02+, ";01 (H/)"(;\*2.0;\*1":=:E02:\*(2\*\*:"1 E(:0CF` J()), ("(;"E/;.\* /), F".J0"/880+.0C":.=C02.` ^)")  
V0"2(\*

"

!

TD"

E0;1\*.0C".("J/H0".` ("&CH\*:(;:\$"d\*.20::0:"/;0"E0;1\*.0C".("J/H0"=2\*(2";0E;0:02./.\*(2"(";&CH\*:(;:"\*2"  
<0:()=.\*(2" ;(+0::"2.0;H\*0` :(";"100.\*2I:\$u"  
"

[# L5B';(-g;!\$(\*+!)!&G+!\$+;(\*<&'()!.-(/+;;!<br>&CH\*:(;:"J(=)C"J0)E".J0" /;.\*0:".("E;0E;/;0"8("0/+J"100.\*2I"/2C"/;0"OPE0+.0C".("/CH\*:0"0.J\*+//),F`^\*.J"  
\*2.0I;\*.F"/2C\*\*2"l((C\*8/\*J.\$&CH\*:(;:"1 /,"2("E;(H\*CO".0:.\*1(2,(":"E0/L"(2"V0J/)8"(8".J0\*;/CH\*:00"=2)0::"  
I\*H02":E0+8\*+E0;1\*:.\*(2".("C(":(;\$"  
"

@J0" /;.\*0:"/;0"OPE0+.0C".("/:L"/2C";0:E(2C".("\_=0:.\*(2:"(2".J0\*;"(` 2"V0J/)8".J;(=IJ(=".J0"<0:()=.\*(2"  
' ;(+0:;\$&).J(=IJ".J0"&CH\*:(;"I020;/)), "1 /,"2(":"E0/L"(2"V0J/)8"(8".J0\*;/CH\*:00F".J0"&CH\*:(;"1 /,"+(2:=")."  
^\*.J".J0\*;/CH\*:00F"0\*.J0;"E;\*H/.0),"/:"200C0CF"("V,"+(280;;\*2I"("E/::\*2I"2(.0:"C=;\*2I"/2,"<0:()=.\*(2" ;(+0::"  
100.\*2I"("2.0;H\*0` \$Y(")(2I0;"("1(;"0\*2H()HOC"C\*:+=:\*(2:F".J0" /;.\*0:"/2C".J0\*;"&CH\*:(;:"J(=)C"/:L"8(""  
V;0/L:".(")/)(` 8("E;\*H/.0"+(2:=")./.\*(2\$"  
"

dJ0;0"/EE)\*+/V)0"=2C0;:".(/.0)/^ (";"5()0I0" )\*+,F"&CH\*:(;:"(";/..(;20,:"/;0"E0;1\*.0C".("8=)),";0E;0:02."  
.J0\*;/CH\*:00:"(";+)\*02.:\*\*".J0"<0:()=.\*(2" ;(+0:F\*\*2+)=C\*2I"/))"100.\*2I:F\*\*2.0;H\*0` :F"/2C"J0/\*2I;\$&).J(=IJ"  
45&6"E;080;:".("J0/\*8;(1" /;.\*0:"C\*;0+.),F\*\*2".J0:0+/:0:F" /;.\*0:"/;0"02.\*)0C".("J/H0".J0\*;"J(:02"  
;0E;0:02./.\*H0:"E;(H\*CO"OH\*CO2+0\$"  
"

9# \$+/(;-5;!CG%+5!] '&G!L5B';(-;!<br>&CH\*:(;:"/;0"02.\*)0C".("J0"/:10"(EE(;.=2\*,"/:".J0\*;/CH\*:00".("/++0:;";0)OH/2."OH\*CO2+0F"/2Ch("J0"/:10"  
^ ;..02\*\*2H0:.\*1 /.\*(2";0E("J././++=;/.0),":=1 1 /;\*e0:".J\*:"OH\*CO2+0\$"  
"

&CH\*:(;:"/;0"OPE0+.0C".("1/\*2./\*2".J0"+(28\*CO2.\*/\*)\*, "(8".J0";0+(;C:".J0"5())0I0":J/;0:"^ \*.J".J01F"-0+.\*(2"BX""  
(8".J0" )\*+, "/CC;0:.\*2I"+(28\*CO2.\*/\*)\*,,\$&CH\*:(;:"1 /,"2("C\*+)(;0"/2,"5())0I0` (;L"E;(C=+."("OH\*CO2+0".J0"  
5())0I0"(V./\*20C":()0),".J;(=IJ".J0"<0:()=.\*(2" ;(+0:."8(""/2,"E=;E(:0"2("OPE)\*+.),"/=.J(\*e0C"V,"45&6\$"  
"

># L5B';(-!:F6+/%&&'()!;



&CH\*: (;\$"-=V:0\_=02.),F".J0"&C1\*2\*:.;./.(;"^\*)"C0.0;1\*20"J(`".("/CC;0::".J0"&CH\*: (;\:"2(29+(1E)\*2+0"/2C"  
8=.;0";()0\$"  
"

BA\$ \$+;(\*&'()!N6&'()!NB+-B'+] "

@J\*:"<0:()=.\*(2"";(+0:F"+(2:\*:\*2I"(8"A28(;1/) "<0:()=.\*(2F"&C1\*2\*:.;./.\*H0"<0:()=.\*(2F"("S0/;\*2I"<0:()=.\*(2\*:"  
.J0"5())0I0b:"+J(:02"/EE;(/+J".("/CC;0:.\*2I"/))"8(;1:"(8"C\*:+;\*1\*2/.\*(2"(2".J0"V/:\*:"(8"E;(.0+.0C"

"  
A."2("20+0:;/;,"("E=;:=0"A28(;1/)"<0:()=.\*(2"8";. "2"(:C0;."("E=;:=0"/2"&C1\*2\*.;/. \*HO"N\$"SO/;\*2I"  
<0:()=.\*(2" ;(+0:;\$"&2,"E/;,"E/;.\*+E/.2I\*\*2"A28(;1/)"<0:()=.\*(2"/2"`.JC;/`"8;(1".JO"A28(;1/)"<0:()=.\*(2"  
' ;(+0:;"/./2,"\*10"/2C\*\*2\*./."0"(;;"0:=10".JO"&C1\*2\*.;/. \*HO"N\$"SO/;\*2I" <0:()=.\*(2" ;(+0:;\$"  
"

@JO" /;.\*0:"1/,"/I;00F"/:"/+(2C\*.(2"(8"02I/I\*2I\*\*2"A28(;1/)"<0:()=.\*(2F"(2" `J/."./0102.: "1/CO"(:"  
OH\*CO2+0":J/;0C"C=;\*2I".JO"A28(;1/)"<0:()=.\*(2"E;( +0:;`\*)"2("VO"+(2:\*CO;0C\*\*2".JO"&C1\*2\*.;/. \*HO"  
<0:()=.\*(2"N\$"SO/;\*2I" ;(+0:;F":J(=)C"A28(;1/)"<0:()=.\*(2"2("VO":=++0:;8=F"=2)0:;"/I;00C".("V,"/))" /;.\*0:;\$"  
"

A8"/2\*\*2HO:.\*I/.\*(2\*\*"/);0/C,"=2CO;` /,F".JO"&C1\*2\*.;/.(;"J/:"C\*:+;0.\*(2".("CO.0;1\*20\*\*8"/2\*\*2HO:.\*I/.\*(2` `\*))"  
VO"E/=;0CF\*\*8\*\*."`\*)"VO")\*1\*.OCF(";"8\*\*."`\*)"+(2.\*2=0"C=;\*2I".JO"A28(;1/)"<0:()=.\*(2"E;( +0:;;\$"  
"

5/.01(;\*0:"(8"A28(;1/)"<0:()=.\*(2"  
"

C<66(-&'B+!\$+; (\*<&'()!

@JO"&C1\*2\*.;/.(;"`\*)"100."` \*J".JO"5(1E)/\*2/2.".("CO.0;1\*20";0/(2/V)0":=EE(; \*HO"10/;:=;0:".J/.";/;0"  
CO:\*120C".("0:.(;0"("E;0;0;HO".JO"5(1E)/\*2/2.\:"/++0:;".("JO"5())010\:"0C=+/.\*(2"E;(I;/1"/2C"/+.\*H\*."0:!!!!\$"  
-+=J"10/;:=;0:"+/2"VO"1(C\*8\*0C"/:".JO"5(1E)/\*2/2.\:"200C:"OH(HO"(HO;"\*10"(";"\*+;+=1:./2+0:"+J/2I0\$"A8".JO"  
<0:E(2C02."J/;"0+0\*HOC".JO"7GA&F".JO"&C1\*2\*.;/.(;"1/,"/):("E;(H\*CO";0/(2/V)0":=EE(; \*HO"10/;:=;0:"8(""  
.JO"<0:E(2C02."/:"CO010C"/EE;(E;/.0\$@J:"(E.\*(2\*\*:"/H/)/V)0` J02".JO"5(1E)/\*2/2."C(0:"2("` /2.".(""  
02I/I0".JO"(.JO;"0:()=.\*(2"(E.\*(2:F/2C".JO"&C1\*2\*.;/.(;"C(0:"2("2\*.\*./0"/"5(1E)/\*2.\$"  
"

:5</%&'()%!9()B+-;%&'()!

@JO"5(1E)/\*2/2.W:Z"1/,"0\_:=0:.".J/.".JO"&C1\*2\*.;/.(;"CC;0:;".JO\*"/)0I/.\*(2:"V,"100.\*2I"W` \*J(";"` \*J(=" "  
.JO"5(1E)/\*2/2.Z` \*J".JO"<0:E(2C02.W:Z".("C\*:+=:;"(2+0;2\*2I"VOJ/H\*(";/2C\*\*2:.\*.\*(2/)E()\*+\*0:"/2C"  
OPE0+./.\*(2:\$`-+=J"/+(2HO;:/.\*(2\*\*:"2(29C\*:+\*E)\*2/;,"/2C"2(29E=2\*."HO\$"<0:E(2C02.W:Z"/;0"2(";"0\_:=\*;"OC".(""  
/..02C":=+J"100.\*2I:F"2(";/;0".JO,"+(1E0))OC".("E;(H\*CO"/2,"\*28(;1/.\*(2\*\*8".JO,"/..02C\$@JO+(2HO;:/.\*(2` `\*))"  
VO"C(+ =102.OC"/:".JO"A28(;1/)"<0:()=.\*(2"8("".JO"1/..0;F\*\*8\*\*."/LO:"E)/+0\$"A2")IJ."(8".J\*:"+(2HO;:/.\*(2F("".JO"  
<0:E(2C02.\:"CO+\*.(2"2((\*)-0.5(2()-0.3(\*)-0.1(E)-0.4(;))0.4()-0.34(\$)-0.4(\*)-0.1(+))0.1(2)-0.4()-0.5(1)0.2(/..



@J0"&C1\*2\*.;/.(:;"J/:".J0"/=.J(;\*.,".("C0.0;1\*20" J0.J0;"&).0;2/.\*H0"<0:()=.\*(2\*\*:"/H/\*)/V)0"(:;"=++0:;8=)F".("8/+\*)/.0"/";0:()=.\*(2".J/."\*:"/++0E./V)0".(("/))" /;.\*0:F"/2Ch(:;"(/++0E.".J0" /;.\*0:\E;(E(:0C";0:()=.\*(2F" =:/)), ".J;(=I J".J0\*;"&CH\*:(;:F"(8.02\*\*2+)=C\*2I".0;1:"(8"+(28\*C02.\*/\*)\*, F";0)0/:0F"/2C"2(29C\*:E;/I0102.\$""

' /;.\*0:"C("2("J/H0".J0"/=.J(;\*.,".(:.\*E=)/.0";0:.;\*.\*(2:(";"(V)\*I/.\*(2:"8(;\*\*2C\*H\*C=/):"(;"I;(=E:".J/."/;0"2(" \*2H()HOC\*\*2".J0"&).0;2/.\*H0"<0:()=.\*(2"E;(+::;\$@J0"&C1\*2\*.;/.(:;"`\*))"C0.0;1\*20" J0.J0;"/CC\*.\*(2/)\*\*2C\*H\*C=/" (;"+(1 1=2\*.,";010C\*0:"/;0"20+0:./;,".("100.".J0\*\*2:.\*.=(2\:"+(1 E)\*2+0"(V)\*I/.\*(2:"\*2"/CC\*.\*(2".("J0" &).0;2/.\*H0"<0:()=.\*(2\$""

@J0"&C1\*2\*.;/.(:;"1/\*2./\*2:;0+(;C:"(8"/2,";0:()=.\*(2".J/."\*:";0/+J0C"/2C"`)E;(H\*C0"2(.8\*/.\*(2".("J0" ' /;.\*0:"(8" J/."\*28(;1/.\*(2\*\*:"1/\*2./\*20C\$Y/\*)=;0".("/V\*C0"V,".J0";0:()=.\*(2"/I;00102."1 /,";0:=")\*2" /EE;(E;\*/.0";0:E(2:\*H0hC\*;\*E)\*2/;,"/+.\*(2:"W0\$I\$F"C\*::()=.\*(2"(8".J0"&I;00102."/2C";0:=1 E.\*(2"(8".J0" <0:()=.\*(2" ;(+0::F";080;;/)"("J0"-.=C02."5!!!!(2C=+.E;(+::"8(;8/\*)=;0".("+(1 E),F"/EE)\*+/.\*(2"(8".J0"

" @J0"A2H0: . \* I / . ( ; ^ \* ) ) " / ) : ( " / : L " 0 / + J " ( 8 " . J 0 " " / ; . \* 0 : " . ( " E ; ( H \* C 0 " / " E ; ( E ( : 0 C " ) \* : . " ( 8 " \_ = 0 : . \* ( 2 : " . ( " / : L " . J 0 " ( . J 0 ; " ' / ; . \* 0 : " / 2 C " / 2 , " ^ \* . 2 0 : : 0 : \$ " @ ( " . J 0 " 0 P . 0 2 . " + ; 0 C \* V \* ) \* . , " \* : " \* 2 " C \* : E = . 0 " / 2 C " ; 0

A8".JO";0+(;C": "2+( 1 E)0.0F".JO"60+\*: \*(291 /LO;"1 /, "C\*;0+."/";09(E02\*2I"(8".JO"\*2H0:. \*I/. \*(2F"("1 /, "C\*;0+."(";  
+(2C=+."/2, "/CC\*. \*(2/)"\*2\_="; , "20+0: : /; , F"\*2+)=C\*2I"\*28(; 1 /)), "1 00.\*2I" ` \*.J".JO" /; .\*0:"(" /2, "` \*.20: : 0:F"\*8"  
200C0C\$"

+ / 2 " ; ( . / . 0 " / 1 ( 2 1 : . " . J 0 " C \* 8 8 0 ; 0 2 . " ; ( ) 0 : " ) \* : . 0 C " / V ( H 0 " \* 2 " C \* 8 8 0 ; 0 2 . " 5 ( 1 E ) / \* 2 . : F . J 0 " 5 ( ) ) 0 1 0 " + / 2 " / ) : ( " C 0 : \* 1 2 / . 0 " E 0 ; 1 / 2 0 2 . " ; ( ) 0 : " 8 ( ; " \* 2 C \* H \* C = / ) : " \* 2 " . J 0 " " ( ) \$ "

1 - % ' ) ' ) 7 ! 0 ; + + ! L 6 6 + ) 5 ' F ! > ! , ( - ! 5 + & % \* \* ; ! ( , ! & - % ' ) ' ) 7 ! , ( - ! . ( ( \* ! 4 + 3 ? + - ; T !

BAAA\$ H (& / + ! ( , ! " ) B + ; & ' 7 % & ' ( ) ! % ) 5 ! L \* \* + 7 % & ' ( ) ; ! Q H N " L T " ' ; \* ( ; " . ( / 2 " \* 2 H 0 : . \* 1 / . \* ( 2 F . J 0 " & C 1 \* 2 \* . ; / . ( ; " ~ \* ) ) " E ; ( H \* C 0 " . J 0 " " / ; . \* 0 : " ` \* . J " / " C 0 . / \* ) O C " ` ; \* . 0 2 " 7 G A & \$ " & 1 0 2 C 1 0 2 . : " / 2 C " = E C / . 0 : " . ( " . J 0 " 7 G A & " 1 / , " V 0 " 1 / C 0 " / : " . J 0 " \* 2 H 0 : . \* 1 / . \* ( 2 " E ; ( 1 ; 0 : : 0 : " / 2 C " 1 ( ; 0 " \* 2 8 ( ; 1 / . \* ( 2 " V 0 + ( 1 0 : " / H / \* ) / V 0 " ; 0 1 / ; C \* 2 1 " . J 0 " / C C \* . \* ( 2 " ( ; " C \* : 1 \* : : / ) " ( 8 " H / ; \* ( = : / ) ) 0 1 / . \* ( 2 : \$ Y







&8.0;/2"2.0;H\*0` F" /; .0:"/2C" ` \*.20::0:"` \*)"V0"/:LOC". ("H0;\*8, ".J0"/++=;/+, "(8".J0";0+(;C\*2IF".;/2:++;\*E.F(" ;=1 1 /; , "(8".J0\*; "2.0;H\*0` \$"@J0, "1 /, " :=V1 \* ." +J/2I0:F"0C\*.:F" (;+);\*8+/. \*(2;\$"A8".J0" /; .0:" (;` \*.20::0:"C(" 2(.";0:E(2C" ` \*.J\*2".J0".\*1 0"E0;\* (C"C0:\*I2/.0C"8(; "H0;\*8+/. \*(2F"(Vj0+. \*(2:". (" .J0"/++=;/+, "(8".J0";0+(;C\*2IF .;/2:++;\*E.F(" ;:=1 1 /; , "` \*)"V0"C0010C". ("J/H0"V002" ` /\*H0CF"/2C"2("+J/2I0:"` \*)"V0"E0; 1 \* .0C\$""

@J0"5())0I0"1 /, "+(2: ()\*C/.0"5(1 E)/^2.: "/I/\*2.: "1 (;0".J/2"(20"<0:E(2C02.F" (;"V, "1 (;0".J/2"(20" 5(1 E)/^2/2."/I/\*2.: "(20" (;"1 (;0"<0:E(2C02.:F" ` J02".J0"/))0I /.\* (2: "/; \* :0"8; (1 ".J0":/1 0"8/+.: "(; " +\*; +=1 :./2+0:" (; "1 E)+/.0"/"E/..0;2F"+())=:(2F"/2Ch("(.J0;":J/;0C" (;":\*1 \*)"/;"+.\*(2:\$""

@J0"A2H0:. \*I/. (;W:Z"., E\*+//), "./LOW:Z".J0"8())(` \*2I":.0E:F"\*8"2(. /);0/C, "+(1 E)0.0C"/2C"2(. "20+0:./;\*), "2".J\*:" (;CO;f"

- " 60.0; 1 \*20".J0"5(1 E)/^2/2.b:"\*C02. \*, "/2C"+(2./+."\*28(; 1 /.\*(2\$"
- " AC02.\*8, "/))"E(\*+0:";0)/.0C". (" .J0"/))0I 0C"

" @J0"<0:E(2C02.\:"C\*:\*E)\*2/;;"J\*:. (;, ""  
" @J0"200C"8(;":/2+.\*(2:h;0:E(2:\*H0"/+.\*(2:."("V;\*2I"/2"02C". (.JO"C\*:\*+;\*1\*2/.\*(2F"J//;/:: 1 02.F"/2Ch(;"  
;0./)\*/\*(2"  
" @J0"200C"8(;":/2+.\*(2:h;0:E(2:\*H0"/+.\*(2:."("E;0H02.".JO"8=.=;0";0+=;;02+0"(8"C\*:\*+;\*1\*2/.\*(2F"  
J//;/:: 1 02.F"/2Ch(;";0./)\*/\*(2"  
" @J0"200C". (";01 0C, ".JO"0880+.. ("8".JO"C\*:\*+;\*1\*2/.\*(2F"J//;/:: 1 02.F"/2Ch(;";0./)\*/\*(2"(2".JO"  
5(1 E)/\*2/2."/2C".JO"+(1 1 =2\*., "  
" @J0"\*1 E/+."(2".JO" /;.\*0:"  
" &2, "(.JO;\*28(; 1 /.\*(2"C00 1 0C";0)0H/2."V, ".JO"60+\*:(291 /LO;W:Z"

@J0":/2+.\*(2:"^ \*)"V0"\*1 E)01 02.0C"/:": ((2"/:\*": "80/:\*V)0"(2+0"/"C0.0; 1\*2/.\*(2\*:"8\*2/)F"0\*.JO;"=E(2".JO"  
(=.+(1 0"(8"/2, "/EE0/)";".JO"0PE\*;/.\*(2"(8".JO"~ \*2C(` ".("/EE0/)F"~ \*.J(="/2"/EE0/)V0\*2I";0\_=0:.0C\$@JO"  
:/2+.\*(2:"C0:\*+;\*VOC"\*2".J\*:"" (\*+, "/;0"2("OP+)=:\*H0"(8F"/2C"1 /, "V0"\*2"/CC\*.\*(2".(F"(.JO;"/+.\*(2:."/LO2F"(;"  
:/2+.\*(2:"\*1 E(:0C"V, "OP.0;2/)"/=.J(;\*.\*0:\$"

!

L# C&<5+)&!C%)/&'();!

[# C&<5+)&!A-(<6!%)5!N-7%)'d%&'(!C%)/&'(; "&!  
@J0"8())(` \*2I"/;0".J0"+(1 1 (2"/2+. \*(2:".J/."1 /, "V0"\*1 E(:OC"=E(2":.=C02."(;I/2\*e/. \*(2:". \*2I), "(;""2"  
+(1V\*2/. \*(2f"  
"

s C)(%\$, .:"&"8(; 1 /)"2(. \*+0".J/.".J0"+(2C=+. "` /:"=2/++0E./V)0F"/2C".J/."8=;.J0;"H\*()/."\*(2:"(8"/2, "5())0I0"  
'( )\*, F"E; (+OC=;0F"("C\*;0+.\*HO"`)0/C". ("1 (;0":0H0;0"/+. \*(2:\$"  
"

s >(\*?)' \$\*%f" &2"(88\*+ /)":/2+. \*(2"8(; "H\*()/."\*2I\*\*2: .\*. \*(2/)" ( )\*, F\*\*2C\*+/. \*2I".J/."1 (;0":0H0;0"C\*:+\*E)\*2/;,"  
/+. \*(2:"` \*)"8())(` ""8"/2, ""2: .\*. \*(2/)" ( )\*, F"E; (+OC=;0F"("C\*;0+.\*HO\*\*:"H\*()/."OC" ` \*.J\*2"/":EO+\*8\*OC". \*10\$"  
@0; 1:"(8"E; (V/. \*(2"1 /, ""2+)=C0"C02\*/)"(8"+0;./ \*2": (+\*/)/2C"0H02."E;"H\*)0I0:F"C02\*/)"(8"5())0I0"8=2C:F"  
\*20)\*I\*V)\*.,"8(;J(2(;:"/2C"/` /;C:F";0:.;+.\*(2:"(2"20` "101V0;";0+;=. 102.F"2(9+(2./+."(;CO;:F"/2Ch(;"  
(.J0;"/EE; (E;\*/.0"10/:.=;0:\$"  
"

s @/&. -%&\$\*%:"@0; 1 \*2/. \*(2"(8":.=C02."I; (=E("(; I/2\*e/. \*(2";0+(I2\*.(2"/2Ch(;""2: .\*. \*(2/)" :=EE(;."8(;"/  
:0."EO;\* (CF"2 (. "0P+00C\*2I". ` (" ,0/;:F"("=2.\*)" :EO+\*8\*+;\*.0;\*/"/;0"10.\$"6=;\*2I":= :E02:\*(2F".J0"1; (=E(";  
(; I/2\*e/. \*(2"+/22(. "+(2C=+. "/2, "V=;\*20::"("E/;. \*+E/.0\*\*2"5())0I0";0)/.OC"/+. \*H\*. \*0:F"(2"(" (889+/1E=\$"  
<09;0+(I2\*.(2\*\*:"E(:;\*V)0"V=. "2(. "I=/;/2.00CF"/2C" ` \*)"(2), "V0"+(2:\*C0;0C"/8.0;".J0":= :E02:\*(2"EO;\*(C"  
02C:F"V/:OC"(2"100.\*2I"/)" ;09;0+(I2\*.(2"+;\*.0;\*/"/2C"(V./ \*2\*2I"5())0I0"+)0;/2+0\$"  
"

s AB. /-&\$\*%:" 0; 1 /202."

" ; -)&&\$, %#-%'1  
" 2-=>M1\*91P\*(1(-9-(())=9\*(1'' -=>)M1\*9Q1>(\*#\*'\$\*%1>(\*, (-&&1  
" ! &&\$, %#-%'1'\*1R-K1@/. -(D\$&\*1  
" ; -&'(\$0'\$\*%1\*91@\$\$. -%"&J1; -&-)(08J1)%" I\*(1>(\*9-&&\$\*%)=2-D-=\*. #-%'1; -&\*/(0-&1  
"

A8".J0":.=C02."<0:E(2C02."/LO:"/"0/H0"8(;"/:EO+\*8\*OC"E0;\* (C"(8".\*10"WO\$I\$F"(20":010:.0;"(;".0;1ZF".J0"  
<0:()=.\*(2" ;(+0::"1 /,"+(2.\*2=0";01 (.0),\$A8"8(=2C"\*2"H\*()/.\*(2F".J/.".=.C02."\*:2("EO;1\*..OC".(;0.=;2".("J0"  
5())0I0"=2)0:."/2C"=2.\*)"/))":/2+.\*(2:F"\*8"/2,F"J/H0"V002":/.\*:8\*OC\$"  
"

[# :36\*(0++;!)

-J(=)C"/2"01E)(,00"<0:E(2C02."C0+\*C0"2("."("E/;.\*+E/.0"\*2".J0"<0:()=.\*(2" ;(+0::F".J0"E;( +0::"E;( +0OC:"  
/V:02:".J0\*;"E/;.\*+E/.\*(2".("/";0/:(2/V)0";0:()=.\*(2\$A8"/2"01E)(,00"<0:E(2C02.";0:\*I2:"8;(1".J0"5())0I0"`.J"  
=2;0:()HOC"

A8".JO"<0\_=0:."8("&EE0/)C(0:"2(."100.".JO"I;(=2C:"\*2".J\*:""()+,F\*:"`\*)"V0"C02\*0C"V, ".JO"&EE0/)" /20)"5J/\*;"  
(; "60+\*:(291/LO;\$@JO" /; \*0:"/2C".JO\*;"&CH\*:(;:"`\*)"V0"2(.8\*0C\*\*2` ; \*2I"(8".JO"C02\*/)/2C".JO";0/:(2:"8(;\*.\$  
A8"/2, "E/;."(8".JO"<0\_=0:."8("&EE0/)"100:.".JO"I;(=2C:"\*2".J\*:""()+,F".JO"&EE0/)" /20)"5J/\*;"(; "60+\*:(29  
1/LO;"`\*)"2(.8, "/)" /; \*0:F".JO\*;"&CH\*:(;:F".JO"&C1\*2\*.: /.(;F"/2CF\*\*8"20+0:./; ,F".JO"A2HO:.\*I/.(;W:Z"/2Ch(; ".JO"  
(; \*I\*2/)"60+\*:(291/LO;\$

&))(.JO;" /; \*0:F".JO\*;"&CH\*:(;:F".JO"&C1\*2\*.: /.(;F"/2CF\*\*8"20+0:./; ,F".JO"A2HO:.\*I/.(;W:Z"/2Ch(; "60+\*:(29  
1/LO;"`\*)";0+0\*HO"/+(E, "(8".JO"<0\_=0:."8("&EE0/)"`\*.J".JO"/EE;(HOC"I;(=2C:"/2C"J/HO"8\*HO"V=:\*20:."C/, :".( "  
;0:E(2C".( ".JO"/EE;(HOC"E(; \*2"(8".JO"/EE0/)\$@JO"&EE0/)" /20)"5J/\*;"(; "60+\*:(291/LO;"`\*)"8(;` /;C"/)"  
;0:E(2:0:."(/)" /; \*0:"8(;;OH\*0` "/2C"+(1102.\$

@JO"2(29/EE0/)\*2I"E/;., "1 /, "/):(.+J((:0".("/EE0/)/. ".J\*:"`\*10\$A8":(F".J/."<0\_=0:."8("&EE0/)"`\*)"V0";OH\*0` 0C"  
V, ".JO"&EE0/)" /20)"5J/\*;"(; "60+\*:(291/LO;".(:00\*\*8\*\*."100:.".JO"I;(=2C:"\*2".J\*:""()+, "/2C`\*)"O\*.JO;"VO"  
/EE;(HOC"("C02\*0C\$A8"/EE;(HOCF\*\*."`\*)"V0"8(;` /;COC".( ".JO\*\*2\*."/)/EE0/)\*2I"E/;., F".JO"&C1\*2\*.: /.(;F"/2C".JO"  
A2HO:.\*I/.(;W:Z"/2Ch(;("I\*2/)"60+\*:(291/LO;F` J("`\*))"J/HO"8\*HO"V=:\*20:."C/, :".( ";0:E(2C\$@JO:0";0:E(2:0:"  
`\*)"V0"+;+=)/.OC"8(;;OH\*0` "/2C"+(1102."V, "/)" /; \*0:\$A8"C02\*0CF".JO" /; \*0:"`\*)"V0"2(.8\*0C\*\*2` ; \*2I\$"  
7("20` "<0\_=0:."8("&EE0/)"1 /, "V0":=V1\*..0C"/8.0;".J\*:"`\*10"E0;\*(C\$@JO"&EE0/)" /20)"5J/\*;"(; "60+\*:(29  
1/LO;"`\*)"+())0+."/2, "/CC\*.(2/)\*\*28(1 /.\*2"200C0CF"/2C"/)"C(+=102./.\*2";0I/C\*2I".JO"/EE;(HOC"/EE0/)"  
I;(=2C:"/2C";0:E(2:0:"`\*))"V0":J/;0C`\*.J".JO"&EE0/)" /20)"(; "60+\*:(291/LO;F` J("`\*))"E;(1E.), ";02C0;/"  
C0+\*:(2\$

9# L66+%!\*>+&+-3')%&'(!. -(/+;;!

A2"1 (:./+/:0:F"/EE0/):"/;0+(28\*20C".("/;OH\*0` "(8".JO" ` ;..02"C(+=102./.\*2";0I/C\*2I".JO"/EE;(HOC"/EE0/)"

@J0"2(. \*8\*/. \*(2"/2"V0"C0)\*H0;0C\*\*2"E0;:(2F"V, "1/"). (.J0"/CC;0:."(2";0+(;CF("V, "01/"). (.J0"(88\*+/"

@J0"/EE0/)"C0+\*. \*(2\*\*:"8\*2/)"2C+(2:.\*.=.0:".J0"Y\*2/)"60.0; 1\*2/. \*(2F" `\*.J"2("8=;.J0;"/EE0/):"/))(` OCF"OH02""8  
.J0;0"/;0"+J/2I0:"(2";01/2C\$A8/"20` "8\*2C\*2I" (;: /2+. \*(2";0:=).:"8; (1".J0"/EE0/F". "+/2"V0"/EE0/)"C"(20"8\*2/)"  
.\*10"/++(;C\*2I". (.J0"(=.) \*20C"E; (+0C=;0:\$A8"/;01/2C")0/C:."("/"20` "C0.0; 1\*2/. \*(2"C\*880;02."8; (1".J0"  
/EE0/)"C"(20F\*\*."+/2"V0"/EE0/)"C"(2+0"1 (:0"(2"/2, "(8".J0"8\*H0"/H/\*)/V)0"1; (=2C:\$"

:# C%)/&' (!C&%&&<;!><-')7!&G+!L66+%!

&2,":/2+. \*(2:\*\*1E(:0C"/:"/";0:=)."(8".J0"C0.0; 1\*2/. \*(2"/;0:./, 0C"W\$0F"2(. \*\*1E)0102.0CZ"C=;\*2I".J0"/EE0/)"  
E; (+0: :F"/2C":=EE(;.\*H0"10/::=;0:"1/, "V0"1/\*2./\*20C" (;;0\*2:./."0C"=2.\*)".J0"/EE0/)"C0.0; 1\*2/. \*(2\*\*:"1/C0\$"

A8"/2, "(8".J0":/2+. \*(2:"/;0". ("V0\*\*1E)0102.0C\*\*110C\*/.0), "E(:.9C0.0; 1\*2/. \*(2F"V="E;09/EE0/)"F".J02".J0"  
010;I02+, ";01(H/)"E; (+0C=;0:"WC0./)"0C"/V(H0Z"8(;"/"]:J(` "+/=:0^"100.\*2I"(2".J0j=:. \*8\*/. \*(2"8(;C(\*2I": ("  
1=:. "V0"E0; 1\*..0C" `\*.J\*2".` ("WRZ"V=: \*20:."C/, :."(8\*\*1E)0102./.\* (2\$""

BBX\$ J()7@1+-3!\$+3+5'+;EN&G+-!L/&'()::"

Y()(` \*2I".J0+(2+)=.\* (2"(8".J0"<0: ()=. \*(2"" ; (+0: :F"/2C\*\*2/CC\*. \*(2". ("2, "/2+. \*(2:\*\*1E)0102.0C" (;A28(; 1/)"  
<0: ()=. \*(2".0; 1:F".J0"&C1\*2:.;./.(; "1/, \*\*1E)0102."/CC\*. \*(2/)"(2I9.0; 1";010C\*0:" (;/+.\* (2:"` \*.J";0:E0+.". ("  
.J0" /;.\*0:"/2Ch(;.J0"5())0I0"+(11=2\*.,".J/./;0\*\*2.02C0C". (:.(E".J0"C\*+;\*1\*2/. \*(2F"J/;/:: 102.F"/2Ch(;"  
;0./)\*. \*(2F";010C, ".J0"0880+.:F"/2C"E;0H02.";0+;;;02+0\$""

@J0:0";010C\*0:h/+.\* (2:"1/, \*\*2+)=C0F"V=. "/;0"2(.)"\*1\*.0C". (f""

- " <080;;/)" (. "+(=2:0)\*2I"/2C"J0/).J":0;H\*+0:"
- " <080;;/)" (.J0"N1E)(, 00"&: :./2+0"" ;(1;/1"
- " 5(=:0"/2C";0I\*.:./.\* (2"/Cj=: .102.:F":=+J"/;0.; (/+.\*H0" `\*.JC;/` /):"
- " NC=+/. \*(2". (.J0\*\*2C\*H\*C=)/)/2Ch(;.J0"+(11=2\*.,"
- " '0; 1/202."/).0;/.\* (2"(8"J(=\*2I"/::\*I2102.:"
- " '0; 1/202."/).0;/.\* (2"(8" ` (;L"/;;/2I0102.: "8(; "01E)(, 00:"
- " ' ;(H\*:\* (2"(8"5/1E=: "-/80., "0:+(; ::"
- " 5)\*1/.0":=;H0, :"
- " ' ()\*+, "1 (C\*8\*+/. \*(2"/2Ch(;.:)/\*2\*2I"
- " ' ;(H\*:\* (2"(8".:/2:E(;./.\* (2"/::\*:./2+0"



!BXAS K%\*!<-+!&(!9(36\*0!] '&G!C%)/&'();8!\$+;6();'B+!L/&'();8!%)5E(-!),(-3%\*\$+\$;(\*<&'!)!1+-3;"  
&))<0:E(2C02.:;/;0"OPE0+.0C".(+(1E), "`\*.J".JO"/:.\*I20C"/2+.\*(2:F";0:E(2:\*HO"/+.\*(2:F"+(;;0+.\*HO"/+.\*(2:F"  
/2Ch(; "A28(; 1 /)"<0:()=. \*(2".0; 1 : "`\*.J\*2".JO".\*108;/10":E0+\*8\*0C"V, ".JO"8\*2/)"60+\*:(291 /LO;W:ZF\*\*2+)=C\*2I".JO"  
&EE0/)" /20)"(; "60+\*:(291 /LO;"(; ".JO"A28(; 1 /)"<0:()=. \*(2"/I;00102.\$"  
"  
Y/\*)=;0". (" /V\*CO"V, ".JO": /2+.\*(2W:Zh/+.\*(2W:Z\*\*1E(:0C"V, ".JO"C/.0":E0+\*8\*0CF"~ JO.JO;"V, ";08=: /)F"201)0+.F"(/2, "  
(.JO;"0/: (2F"1 /, ";0:=).\*\*2"/CC\*. \*(2/)" /2+.\*(2W:Zh/+.\*(2W:ZF\*\*2+)=C\*2I":=: E02:\*(2F"OPE=):\*(2F"/2Ch(; "  
.0; 1 \*2/.\*(2"8; (1 ".JO"5())0I0\$"-=E0;H\* (;:"

"  
G.J0;"-EE(;."  
"

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U?"

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

L . . : H > " 2 ! L V ! I : L \$ " H A ! \$ : C N J O 1 " N H ! . \$ N 9 : C C !

@J0"&C1\*2\*.:./.(;"`\*)"(2), "E;(H\*C0".J0"\*1E/+.":./0102.:". ("J0"60+\*:(291/L0;"8".J0"60+\*:(291/L0;"C0.0;1\*20:".J/.".J0" (")+,"J/:"V002"H\*()/0C\$dJ02".J0"&C1\*2\*.:./.(;"J/;0:".J0"\*1E/+.":./0102.:`\*.J".J0"60+\*:(291/L0;F".J0,"`\*))"/): ("V0":J/;0C`\*.J".J0" /;.\*0:"\$"

" >'.%?'\*!&0!L//(33(5%&'();!%)5!N&G+-!L;;';&%) /+\$"" /;.\*0:":J(=)C"+(2./+.".J0"&C1\*2\*.:./.(;" /.)0/;." .J;00"WtZ"V=:\*20:":C/, :E;\*("(.J0"J0/;\*2I".(//;;/2I0"/2,"C\*:/V\*)\*,"/++(11(C/.\*(2:F)/2I=/I0" /:.\*:./2+0F"/2Ch(;\*\*2.0;E;0./.\*(2":0;H\*+0:".J/."1/, "V0"200C0C"/.".J0"J0/;\*2IF\*\*0"E(::\*V)0\$""

" 9(), \*\*/&;!(,!)&+--+&!(-![ '%;#@J0"60+\*:(291/L0;"1=:. "2(.J/H0"/"V\*/:"8(;(" /I/\*2:."+(1E)/\*2/2.:(" ;0:E(2C02.: "I020;/)), ("(.J0"\*2C\*H\*C=/)5(1E)/\*2/2."(<0:E(2C02.\*\*2"E/;.\*+=)/;\$"  
@J0"60+\*:(291/L0;"1=:. ;0+=:0".J01:0)HO:"\*8":=+J"V\*/:"(+ (28)\*+."(8\*\*2.0;0:."0P\*:.:.\$"  
A8".J0"60+\*:(291/L0;"V0)\*0HO:".J0;0\*:"E(::\*V)0+(28)\*+."(8\*\*2.0;0:."(; "V\*/:F".J0,"`\*))"+(2:=). "`\*.J"  
.J0"&C1\*2\*.:./.(;" /V(="E(::\*V)0";0+=:/)"(;";01(H/\$""  
@J0" /;.\*0:"1/, ";/\*:0"+J/)02I0:".J/.".J0"60+\*:(29



S(` OH0;F".J\*:"/CH/2+0";OH\*0` "(EE(;.=2\*.,"C(0:"2(.E;0+)=C0".J0" /;.\*0:"8;(1" :=V1\*.\*21"/" \_=0:.\*(2"/".J0" J0/;\*21"8(;".J0"8\*;. . .\*1 0"(/:/: L\*2I"8(;"/";0+(2:\*C0;/.\*(2"(2"/"60+\*:(2"1 /LO;\:"E;09J0/;\*21"C0+\*:(2"V/:0C"(2" /2,"20` \*28(;1 /.\*(2"(/;.0:.\*1 (2,"(880;0C"/".J0"J0/;\*21"\$@J0"60+\*:(291 /LO;"` \*)"C(+ = 1 02."/2C":J/;0".J0\*;" /;.\*(2/0"8(;"/2,"OH"C02+0"(/; \_=0:.\*(2"OP+)=.\*(2"(/;\*2+)=\*(2F""8"/2,F"/." /"E;09J0/;\*21"1 00.\*21" `\*.J"0/+J"E/;.,,\$" "

@J0"60+\*:(291 /LO;"` \*)" ` (/L" `\*.J".J0" /;.\*0:".("8\*2/)e0"/" `\*.20:.)":.8(;".J0"J0/;\*21F"/2C".J0"&C1 \*2\*:./;.(;" `\*)"2(\*8,"/2,"`\*.20::0:"(8".J0"J0/;\*21\:")(I\*:.+;\$@J0"60+\*:(291 /LO;F"() \*0" `\*.J".J0"/I;001 02."(8"/)" /;.\*0:F" 1 /,"C0+C0"\*2"/CH/2+0"(8".J0"J0/;\*21".J/."+0;./\*2" `\*.20::0:"C"(2("200C".("V0"E;0:02."\*8".J0\*;.0:.\*1 (2,"+/2" V0"/CO\_=/ .0),": = 1 1 /;\*e0C"V,".J0"A2H0:.\*I /.(;W:Z""2".J0"Y\*2/)A2H0:.\*I /.\*(2"<0E(;.(;"C=;\*21".J0"J0/;\*21F"/2C" .J0\*;"E;0:02+0"\*:(2("0::02.\*/)".("/::0::".J0\*;" +;0C\*V)\*.,,\$" "

' ;09J0/;\*21"1 00.\*21W:Z" `\*)"2(. "V0";0+(;C0C\$@J0"E;09J0/;\*21"1 00.\*21:" `\*)"., E\*+/,), "V0"+(2C+=.0C"/:"0E;/ .0" 100.\*21:" `\*.J"0/+J" /;., h&CH\*:(;F"/2C"+/2"V0"C(20";01 (.0),F"(/:"/" `;..02"+(1 1 =2\*+/.\*(2"OP+J/2I 0\$"@J0" 60+\*:(291 /LO;"` \*)" ` (/L" `\*.J".J0" /;.\*0:".("0:./V)\*:J".J0"8(;1 /." /2C".\*1 \*21"(8".J0"1 00.\*21:" /2C" `\*)"+\* ;+=)/.0" /": = 1 1 /;,"(8"/2,";=)\*21:"1 /CO".("02:=;0"/)" /;.\*0:"/2C"&CH\*:(;:"/;0"/ ` /;0\$" "

!  
`# I +%-')7!.-(/+5<-+;!`

C0.0; 1\*2/.\*(2:"(2"/2,"/CC\*.\*(2/)/)010C"+())/.0;/)"1\*:+(2C=+."J/."(++=;;0C\*\*2"+(2+0;."`\*.J".J0"  
C\*:+;\*1\*2/.\*(2F"J/;/:::1 02.F";0./)/.\*(2F("G.J0;" ;(J\*V\*.0C"30J/H\*(;F"0H02".J(=I J".J(:0"+())/.0;/)/))01/.\*(2:"  
1/, "2(."E0+8\*+/), "8/)"`\*.J\*2".J0" ( )^\*, \$"

!

9# D(')&! +%-')7;!

A2"5(1 E)/\*2.:\*\*2H()H\*2I"1 (;0".J/2"(20"<0:E(2C02."/2Ch(;\*\*2H()H\*2I"1 (;0".J/2"(20"5(1 E)/\*2/2."/++=:\*2I".J0"  
:/1 0"E0;;(2"(8"=V:./2.\*/), ".\*1\*)/;+(2C=+.F".J0"C08/=)."E;(+0C=;0"`)V0".(J0/;.J0"/)01/.\*(2:"j(\*2.), \$"

"





L . . : H>"2![V!="NJ: H9: !\$"Ch!LCC: CC4: H1!Q=\$LT!

"

@J;0/./::0::1 02."\*:".J0"E;(+0: "(8"/::0::2I".J0"/+.\*(2/V)\*.,"(8"H\*()02+0"V,"/"E0;:(2"/I/\*2:./2(.J0;"E0;:(2"  
("I; (=E"8())(`\*2I".J0"\*:./2+0"(8"/"C\*;0+."(;"+(2C\*.\*(2/)".J;0/.\$"&"='(\*+)/+!\$';W!L;;+;;3+)&!Q=\$LT\*:"/"  
V;(/C0;"0;1"=:"0C".("/::0::"/2,"E(.02.\*/)H\*()02+0("C/2I0;F";0I;/;C)0:"(8".J0"E;0:02+0"(8"/H/I=0F"  
+(2C\*.\*(2/)F("C\*;0+.".J;0/.\$""

"

A1E)0102.\*2I"/"X<&"0\_="\*0:"E0+\*8\*+."/2\*2I\$A."\*:". , E\*+//), "+(2C=+.0C"V,"E:, +J() (I\*.:F"+)\*2\*+//)+(=2:0)(;:F"  
:(+\*/)"` (;L0;:F+/:0"1/2/I0;:F)/` "028(;+0102."(88\*+0;:F":.=C02."+(2C=+."E;(80:.\*(2/):F"/2Ch(;".J0;"  
30J/H\* (;/)A2.0;H02.\* (2"@0/1"W3A@Z"W: (10.\*10:"L2(`2"/:"5;\*:\*F&: :0::1 02.F"<0:E(2:0"x"NH/)=/.\*(2"(";  
"5&<N".0/1Z"101V0;:.\$""

"

&"X<&"(++=;:"2"+())V(/.\*(2" `\*.J".J0"3A@F"5&<N".0/1F"/2Ch(;".J;0/./::0::1 02.".0/1"/2C"1 =:."V0"

!

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"

@J0"X<&"\*(2C=+.0C\*\*2C0E02C02.), "8; (1".J0"<0: ()=. \*(2" ; (+0::F\*\*28(; 1 0C"V, ".F"V=. "8;00"8; (1 "(=.+(1 0" E;0::=;0\$@J0"E0;:(2W:Z+(2C=+. \*2I".J0"/: :0:: 1 02."` \*)"V0".;/ \*20C". ("1 \*.I/.0"/2, "V\*/:/"2C"E; (H\*C0".J0" /2/), :\*:"/2C"8\*2C\*2I: "2"/"8/\*;"/2C"0\_=. /V)0"1 /220;\$""

"

@J0"@\*. )0"AB"@0/1 "1 0 1 V0;W:Z+(2C=+.:/"X<&"E; (+0: :"/2C"1 /L0: "/" ;0+(1 1 02C/. \*(2". (.J0"&C1 \*2\*: .;/ . (; "/: ". (" ` J0.J0;".J0"X<&"\*2C\*+/.0: ".J0;0\*\*:"/" : =V: ./2.\*/)F"+ (1 E0))\*2IF"/2Ch(; "1 1 0C\*/.0";\*:L". (.J0"J0/).J"/2Ch(; " :/80., "(8"/"E0;:(2" (; ".J0"+(1 1 =2\*. , \$""

"

A2": (1 0"+\* ; += 1 :./2+0:F".J0"&C1 \*2\*: .;/ . (; "1 /, "C0.0; 1 \*20".J/."/"X<&":J (=)C"V0"+ (2C=+.0C"V, ".J0"@\*. )0"AB"@0/1 " /:"E/; "(8".J0\*\*2\*.\* /)"OH)/=/. \*(2"(8"/"5(1 E)/\*2."=2C0; ".J\*:" ()\*+, \$"&"X<&"+/2"/"C\*\*2"+; \*.\*+ /)/2Ch(; ;0\_\*=;0C" C0.0; 1 \*2/.\* (2:F\*\*2+)=C\*2IF"

"

!Z dJ0.J0;". (" ;01 (H0".J0"<0: E (2C02." (2"/2"0 1 0; I02+, "V/:"\*:"V0+ /=: 0" (8"/2\*\*1 1 0C\*/.0".J;0/.". (" /" E0;:(2" (; ".J0"+(1 1 =2\*. , \:"J0/).Jh:/80., "WN 1 0; I02+, "<01 (H/)Z"

RZ dJ0.J0;".J0"&C1 \*2\*: .;/ . (; :J (=)C"E=; : =0h: \*I 2"/"5 (1 E)/\*2."/V:02."/"` \*)\*2I h/V)0"5 (1 E)/\*2/2."

TZ dJ0.J0;".J0":+(E0" (8"/2\*\*2H0: . \*I /.\* (2":J (=)C\*\*2+)=C0"/2\*\*2+\*C02.F"/2Ch(; "E/..0;2" (8"1 \*:+(2C=+.F" /2Ch(; "+) \*1 /.0" (8"C\*:+; \*1 \*2/.\* (2" (; "J/;/: : 1 02."

%Z @("J0)E\*\*C02.\*8, "E (.02.\* /)"E;0C/ . (; , "+(2C=+."

UZ @("J0)E"/: :0: :h\*C02.\*8, "I; ((1 \*2I"VOJ/H\* (; :"

>Z dJ0.J0; ".\*:";0/: (2/V)0". (.;, ". (":0: ()H0"/"5 (1 E)/\*2."J; (=I J"A28(; 1 /)"<0: ()=. \*(2F"/2C\*\*8": (F\*\*0\*\*\*q0.2400\*8;C"00

>>"

!

L. . . : H>"2!9V!L1"2L!\$: 9N\$>!4L"H1: HLH9: !LH>!L99: CC!4N>: J!. NJ"9P!

"

. (\*! /0!C/ (6+!

@J\*:" ( )\*, "+(H0;:";0+(;C:"1 / \*2. / \*20C\*\*2"/2, "1 0C\* = 1 ". J / . "/; 0"+; 0/ . 0C"E = ; : = /2. ". (. . J0"5 ())01 0\:"7 (29"

!

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/))"EJ, : \*+/"0H\*C02+0" ` \*)"V0";0./\*20C" ` \* .J".J0"5 (1 E)/\*2. "8")0\$"

!  
!

L. . : H>"2!>V!1\$L"H"HA!KN\$!4: 4 [: \$C!NK!1I : !\$: CNJO1"NH!. \$N9: CC!. NNJ!

<0: ()=. \* (2" ; (+0: : " ( ()"101 V0; : ;0+0\*H0"/22=/" .; /\*2\*2I";0)/.0C". (.J0\*; ;0: E0+. \*H0"; ()0:\$@J\*: ". ; /\*2\*2I"1 / , "  
\*2+)=C0F"V=. " : "2 (." ) \* 1 ".0C". (F"

" @J0":+(E0"(8".J0"45&6\:"7 (296\*:+;\*1\*2/.\*(2"@.)0"AB" ( )\*, ""

" @J0"5 ()0I0\:"<0: ()=. \* (2" ; (+0: : "

" S(` ". (+ (2C=+. \*2H0: . \*I / . \* (2: "/2C"J0/ ; \*2I : ".J / . "E; (.0+ . "J0": /80. , "(8"5 (1 E)/\*2/2. : "/2C"<0: E (2C02. : F"/2C"  
E; (1 (.0"/++ (=2./V)\* , "

" A1 E)\*. "V\* / : "/2C"+ (28\* ; 1 / . \* (2"V\* / : "x" . ; 0 / . \*2I" / ; . \*0: "0\_ = \* . /V) , "

" 6\* : E / ; / .0" . ; 0 / . 102. "/2C"C\* : E / ; / .0\*1 E / + . "

" <0E ( ; . \*2IF"+ (28\*C02. \*)\* . , F"/2C"E ; \*H / + , " ; 0\_ = \* ; 0102. : "

" &EE)\*+ /V)0"/ ` : F" ; 0I =) / . \* (2: F"/2C"80C0; /)" ; 0I =) / . ( ; , "I = \*C/2+0"

" S(` ". (\*1 E)0102. "/EE; (E; \* / .0"/2C": \* . = / . \* (29: E0+\*8+ ; 010C\*0: "

" S(` ". (\*2H0: . \*I / .0\*\*2"/" .J ( ; (=I JF";0)\* /V)0F". \*10) , F"/2C"\*1 E / ; . \*)"1 /220; ""

" @; / = 1 /9\*28 ( ; 10C"E; /+ . \*+0: "E0; . / \*2\*2I". (\*2H0: . \*I / . \* (2: "/2C"; 0: ()=. \* (2"E; (+0: : 0: "

" S(` ". ("=EJ ()C"8/\* ; 20: : F"0\_ = \* . , F"/2C"C=0"E; (+0: : "

" S(` ". ("` 0\*I J"0H\*C02+0F"J(` ". (+ (2C=+. "\_=0: . \* (2\*2IF"/2C"J(` ". ("/: : 0: : "+; 0C\*V)\* , "

" A1 E / ; . \*)\* . , "/2C" (Vj0+ . H\* . , ""

" S(` ". (" ; 02C0 ; "8\*2C\*2I : "/2C"1020; / .0"+)0 / ; F"+ (2+ : 0F"0H\*C02+09V / : 0C"; / . \* (2 /)0: ""

" @J0"C08\*2\* . \* (2: " (8"/)"E; (J\*V\*.0C"+ (2C=+. ""

" S(` ". (+ (2C=+. "/2\*\*2H0: . \*I / . \*TJETQq0.240Tf(")TJETQq240-797Tm0.3(2)BT50734.416.6583. (+)0.197-43Qq0.TQo

>M"

!

" @J0";()0"(8".J0"@\*. )0"AB"5((;C\*2/.(;"  
" 5)0;,"&+.hX&d&";0\_=";0102.:"/EE)\*+/V)0". ("@\*. )0"AB"  
" 45&6\:"(V)\*I/. \*(2:"=2C0;"@\*. )0"AB""  
" S(` ".("/EE), "C08\*2\*. \*(2:"="=0C"V, ".J0"5())0I0"~ \*.J";0:E0+.". ("+(2:02.F".J0"/V:02+0"("201/. \*(2"(8"+(2:02.c""  
" <0/:(2/V)0"1 (C\*8\*+/. \*(2:"/2C":E0+8\*+/" +. \*(2:". ("E;0H02."C\*:+;\*1\*2/. \*(2"/2C"02:=;0"0\_="/)/++0:."8(";  
E;0I2/2+, "(;"0)/.0C"+(2C\*. \*(2:""