

EDST5113

5 i h]ga 'GdYWfi a '8]gcfXYf. '9Xi WUh]cbU`'DfUWf]VWg

GYa YghYf'C bY''##'&\$%

7ci fgY Cj Yfj]Yk

GHJZZ7cbHJWh8YHJ]`g`

7cbj Ybcfg

BUa Y	9a U]`	5j U]`UV]`]m	@cWJhjcb	D\cbY
j U GlfbUXcj U]"gffbUXcj U4 i bgk "YXi "Ui		>c\b'; ccXgY`` 6i]`X]b[Fa"&&-	\$(&* [·] -) - %+&

GWkcc~7cbhJWh~abZcfa Uhlcb

GWXcc``cZ9Xi WUhjcb 5fhg`UbX`GcWjU``GWjYbWYg

@Yj Y``%z`>c\b'; ccXgY```6i]`X]b['fl &\$Ł

H. Ž*%f&Ł'-',) '%++

9. YXi WUhjcb4 i bgk "YXi "Ui

K . YXi WUNcb"Ufhqi bak "YXi "Ui

5 hmyb XUb WY F Yei]fYa Ybhg

5XX]h]cbU``GWXcc``cZ'9Xi WUh]cb'UhYbXUbWY fYei]fYa Ybhq

#i]g Yl dYWYX th UhiUbmghi XYbhYbfc "YX"]b 'Ub '98 GH 'Wci fgY 'k]th 'th Y 'GWk cc "cZ9Xi WUh]cb 'k]" a U_Y 'U Wca a]ha Ybhhc 'th Y]f" YUfb]b['UbX 'UthYbX 'U" 'WUggYg ']b 'Z "" k \YfY 'WcbhYbh]g 'XY ']j YfYX ']b 'U 'ZJWY!hc! ZJWY a cXY 'Yl WYdh]b 'WftW]a gtUbWYg 'k \YfY 'UVgYbWY ']g 'Xi Y 'hc '] "bYggža]gUXj Ybhi fY cf"i bZcfYgYYb WjfW a gtUbWYg 'VYmcbX'th Y 'ghi XYbhg 'Wcbffc" '' 5 'a]b]a i a 'UthYbXUbWY 'fYei]fYa YbhcZ, \$i ']g 'fYei]fYX 'Zcf YUW. 'Wci fgY" '' #b 'WYftU]b 'WjfW a gtUbWYgžU 'ghi XYbha Uma]gg ii d 'hc '&\$i 'c ZU 'Wci fgY 'k]th ci h'Zcfa U 'Udd ']WUh]cb 'UbX'i d 'hc '' 'i 'c ZU 'Wci fgY 'k]th 'Zcfa U 'XcW a YbhUh]cb 'fgYbhj]U Ya U] 'hc 'Wci fgY 'Wcbj Ybcft dfcj]X]b['U" 'th Y 'fYei]fYa Ybhg 'XYhU] 'YX 'VY ck 'UfY 'a Yh" 'Ghi XYbhg 'bcha YYh]b['th Y 'UthYbXUbW' fYei]fYa Ybhg 'ci h]bYX 'Uvcj Y 'k]" 'VY 'Uk UfXYX 'Ub 'I bgUh]gZJWcfm: U] 'fI : Ł 'Zcf'th UhWci fgY 'fY[UfX 'Ygg c Z th Y]f'dYfZcfa UbWY ']b 'th Y 'UggYgga YbhHUg_g cf'ch Yf'fYei]fYa Ybhg 'Zcf'th Y 'Wci fgY"

: cfiZ fh\Yfi]bZcfa Uh]cbicbi9Xi WUh]cbiWci fgYiUhhYbXUbWifYei]fYa YbhgžidiYUgYifYZYfihcih\YifYgdYWf]j Y 98GHiA ccXiYia cXi `YfgŁ"

5 WUXYa 1W = 1 Zcfa Uhlcb

5```gh XYbhg`a i gha U_Y`U`j U`]X`UhhYa dh'UhU```UggYgga Ybhg`]b`cfXYf`hc`dUgg`h\Y`Wti fgY"

: cf`YggYbh]U``ghi XYbh`]bZcfa Uh]cb`fY`Uh]b['hc.`fYei Yghg`Zcf`Yl hYbg]cb/fYj]Yk 'cZa Uf_g/cWW dUh]cbU``\YU`h\
UbX`gUZYhm'Yl Ua]bUh]cb`dfcWXi fYg/gdYV]U``Wcbg]XYfUh]cb`]b`h\Y`Yj YbhcZ]``bYgg`cf`a]gUXj Ybhi fY/
ghi XYbhYei]hmUbX`X]gUV]`]hm'UbX`ch\Yf`YggYbh]U``UWUXYa]W]bZcfa Uh]cbž
gYY`\hdg.#k k k "Ufhg"i bgk "YXi "Ui #W ffYbhghi XYbhg#JWUXYa]W]bZcfa Uh]cb#dfchcWc`g![i]XY`]bYg#

7ci fgY 8YHJ] g

7 fYX]hDc]bhg * *

Gi a a UfmcZh\Y 7ci fgY

Ghi XYbhgik]h\ 'Ui h]ga igdYWfi a iX]gcfXYfifbG8ŁZUWYi]a a YbgY'W\U`Yb[Ygi]b'YXi WUh]cbU``Ybj]fcba Ybhg'' Mci ik]```Yb[U[Yik]h\ 'Wi ffYbh_bck `YX[Y'UVci hiW\UfUWhYf]gh]Wg'UbX'YZZYWhji Y'Yj]XYbWY!VUgYX'dfUWhWg i gYX'hc'Ugg]ghighi XYbhgik]h\ 'Ui h]ga igdYWfi a iX]gcfXYfifbG8ŁUWWca d`]g\ 'h\Y]f'YXi WUh]cbU``[cU'g''Mci ik]``Yb[U[Yik]h\ 'h\Ycf]Ygz'gcW]YhU``Uhh]hi XYgz'Y[]g`Uh]cbz'UbX'dc']Whihc'XYj Y`cd'mci f'dfcZYgg]cbU``^ X[a Ybhg UbX'hYUW\]b[idfUWh]WYg''Mci ik]```YUfb']bghfi Wh]cbU``UbX'W ff]W\ ia !VUgYX'ghfUhY[]Yg'UbX'W ff]W\ ia UX^ gha Ybhgih\Uhmci 'WUb'i gY']b'mci f'hYUW\]b[idfUWh]WY''Mci ik]```U`gc``YUfb'UVci hiW\U``Yb[Yg'ZUWYX'Vm ZJa]']Yg'cZghi XYbhgik]h\ '5G8z'UbX'`YUfb'YZZYWhji Y'ghfUhY[]Yg'hc'dfca chY'\ca Y!gW\cc`'Wc``UVcfUh]cb'''Mci k]```VYWca Y'UWei U]bhYX'k]h\ ']ggi Yg'UbX'gi ddcfhg'fY'Yj Ubh'hc'UXi 'hg'k]h\ '5G8''

5 hith Y'WcbWi g]cb'cZhh]g'Wci fgY'hhY'ghi XYbhik]``VY'UV`Y'hc

- %" 7 f]h]WU``miYb[U[Y`k]h\ 'h\Y'h\Ycf]Yg`i bXYf`m]b['h\Y'dfYj U]`]b['Uhi]hi XYg`hck UfXg`dYcd`Y`k]h\ 'Ui h]ga gdYWfi a 'X]gcfXYf'''''
- &" 5dd`m`Y[]g`UhJcb`UbX`dc`]WmfY`UhYX`hc`h\Y`YXi WUhJcb`UbX``]ZY`cZdYcd`Y`k]h\`Ui hJga `gdYWfi a X]gcfXYf`hc`dfcZYgg]cbU``^ X[a Ybhg`UbX`XYWJg]cbg"```
- ' " 5 fh]W `UhY`W ffYbh]ggi Yg`UbX`hfYbXg`]b`fY[UfXg`hc`h\Y`Z]Y`X`cZUi h]ga `gdYWfi a `X]gcfXYf`hc`fY`Yj Ubh ghU_Y\c`XYfg"```
- ("DYfZcfa 'W'ff]W'i a 'UX1 gha Ybhg'hc'Ugg]ghighi XYbhg'k]h\'Ui h]ga 'gdYWfi a 'X]gcfXYf'hc'a YYh YXi WUh]cbU`ci hWca Yg"

HYUWX]b['GhfUhY[]Yq'

X]gW ggYX/

 $\hbox{$\mathbb{E}^{+++}$ I gY'cZa cV]'Y'hYWbc'c[mhc'YId'cfY'557'Uddg'h\Uh'ZJW]']hUhY'Wcaaib] wuhjcb}$

.

 $H Y = \frac{1}{2} \left[\frac{$

5i ghfu`]Ub'DfcZYgg]cbU`; fUXi UhY'HYUWX]b['GhJbXUfXg

5ggYgga Ybh

5ggYgga YbhHUg_g

5ggYgga Ybh'hUg_	K Y][\h	Ghi XYbh'@YUfb]b[Ci hWca Yg 5ggYggYX	5 + HG@'DfcZYgg]cbU`; fUXi UhY HYUW\]b['GHJbXUfXg'5ggYggYX	8iY 8UHY
9ggUmi) \$1	%ž&Ž	%"* "&ž "' "(ž+"&"&	&- #\$' #& \$% \$) .\$\$ DA
±bZcfa Uhjcb Vcc_`Yhi) \$1	&Ž Ž(%") "&ž%"* "&ž&"* "&ž "' "(ž("%"' ž+ "&"&ž+"' "' ž +"("(&(#\$)#& \$% \$).\$\$ DA

D'YUgY fYZYf hc 3gefcS/[S` BdaXWee[a`S^EfS`VSdVe XadFWSUZWde cb h\Y dfYj]ci g dU[Y

5ggYgga Ybh'8YhJ]`g

5ggYgga Ybh'% '9ggUm

GhUfhXUhY. Bch5dd`]WUV`Y

8YHJ]`g. '9ggUmi! '' \$\$\$`k cfXgGhi XYbhg`k]```fYWl]j Y`k f]hh/b`ZYYXVUW_`k]h\]b`h\fYY`k YY_g`cZgi Va]gg]cb"

5XX]h]cbU`XYhU]`g.

H\Y`UggYgga Ybh'%bYYXg`hc`VY`VUgYX`cb`%&`dYYf!fYj]Yk YX`'ci fbU``UfhJWYgžk\]W\k YfY`di V`]g\YX`]b``Ugh`) '!`%\$`mYUfg`f]"Y"žVYk YYb`&\$\$-`UbX`&\$% Ł"`D`YUgY`bchY.`9bWnWcdUYX]U`cf`X]WfjcbUf]Yg`a Um`VY Wcbgi``hYX`hc``YUfb`VUW_[fci bX`UVci himci f`hcd]W£Vi hh\Ymk]```bchVY`Wci bhYX`Ug`cbY`cZmci f`fYZYfYbWYg"

 $H\Y''UggYgga\Ybh'''g\ci``X'VY'Xci\V'Y!gdUWX''UbX'kf]hhYb']b'5D5'*h\'YX]h]cb'ghm'Y''&dh'Zcbh'fY''["žH]a Yg'BYk'F ca UbŁ/gYY'h\Y'Zc'``ck]b['k YVg]hY'Zcf'Ugg]ghUbW'k]h\h\]a. \\hd.#ck`'"Yb[']a\"di fXi Y"YXi #ck`#Yqci fW## *$#$\%#$

Ghi XYbhgik]``kf]hYiU'' ****\$\$\$ YggUm**fYZYWh]b[icbiF]hUi>cfXUbfigighUhYa Ybhif&\$%*E'UVci hiUi h]ga igdYWhfi a X]qcfXYfi]bifY`UhlcbihciYXi WUhlcbi"

5ggYgga Ybh& ⇒Zcfa Uh]cb Vcc_Yh

GHJfhXUhY. Bch5dd`]WJV`Y

8YHJ]`g.

Gi Va]gg]cb cZ5ggYgga YbhHUg_g

Gh XYbhgʻUfYʻYl dYWYX`hcʻdi hh\Y]fʻbUa YgʻUbXʻgh XYbhibi a VYfgʻcbʻYj YfmdU[YʻcZh\Y]fʻUgg][ba Ybhgʻ

Hi fb]h]b Gi Va]gg]cb

#mci YbWci bhYf'U'dfcV'Ya k \Yb'UhYa dhJo['hc'gi Va]hmci f'Ugg][ba Ybhh\fci [\'Hi fb]h]bž'd'YUgY
hY'Yd\cbY'9l hYfbU'Gi ddcfhcb'-',) "''' %cf'Ya U]'h\Ya 'cb'<u>Yl hYfbU'hY'hgi ddcfh4 i bgk "YXi "Ui"</u>"'Gi ddcfh
\ci fg'UfY', .\$\$Ua '-'%\$.\$\$da 'cb'k YY_XUmg'UbX'-.\$\$Ua '-').\$\$da 'cb'k YY_YbXg'fl *) 'XUmg'U'mYUfŁ"'#mci
UfY'i bUV'Y'hc'gi Va]hmci f'Ugg][ba YbhXi Y'hc'U'ZJi 'hk]h\'Hi fb]h]b'mci 'a Um'Udd'mZcf'Ub'Yl hYbg]cbž'Vi hmci
a i ghfYhJ]b'mci f'h]W_Yhbi a VYf'Zfca '9l hYfbU''Gi ddcfhfU'cb['k]h\'Ubmch\Yf'fY'Yj UbhXcW a YbhgŁ'hc
]bWi XY'Ug'Yj]XYbW'hc'gi ddcfhmci f'Yl hYbg]cb'Udd']WUh]cb"'#mci 'Ya U]''9l hYfbU''Gi ddcfhmci 'k]''
Ui hca Uh]WU''mfYWY]j Y'U'h]W_Yhbi a VYfž'Vi h]Zmci 'hY'Yd\cbY'mci 'k]'''bYYX'hc'gdYW]ZJWU''mUg_'Zcf'cbY"
Hi fb]h]b'U'gc'dfcj]XYg'i dXUhYg'cb'h\Y]f'gmghYa 'ghUh' g'cb'Hk]hYf"

; YbYfU``mž'UggYgga YbhitUg_g'a i ghVY'gi Va]hhYX'Y`YWfcb]WU``mj]U'Y]h\Yf'Hi fb]h]b'cf'U'A ccX`Y Ugg][ba Ybh'' =b']bghUbWfg'k \YfY'h\]g']g'bchdcgg]V`Yž']hk]```VY'ghUhYX'cb'mci f'Wci fgY'g'A ccX`Y'g]hY'k]h\U`hYfbUh]j Y'gi Va]gg]cb'XYhU]`g''

@UhY 5ggYgga Ybh'DYbU`h]Yg

5b'UggYggYX'HUg_']g'XYYa YX``UhY']Z]h']g'gi Va]hhYX'UZhYf'h\Y'gdYW]Z[YX'h]a Y'UbX'XUhY'Ug'gYhci h']b'h\Y Wci fqY'@YUfb]b['A UbU[Ya YbhGmqhYa 'f@A GŁ"

$$\label{thm:condition} \begin{split} &\text{H}^{\text{U}$$

K cf_'gi Va]hhyx'zci fhyyb'fl%(EXUmg'Uzhyf'h\y'Xi Y'XUhy'k]``VY'a Uf_YX'UbX'zYYXVUW_'dfcj]XYX'Vi hbc'a Uf_ k]``VY'fYWcfXYX"'=Zh\Y'k cf_'k ci `X'\Uj Y'fYWr]j YX'U'dUgg'a Uf_'Vi hzcf'h\Y'`UhybYgg'UbX'h\Y'k cf_']g'U Wca di `gcfm'Wci fgY'Wca dcbYbhz'U'gh XYbh'k]``VY'XYYa YX'hc'\Uj Y'a Yhih\UhfYei]fYa Ybh''H\]g'XcYg'bch Udd`mhc'U'hUg_'h\Uh']g'UggYggYX'Vi hbc'a Uf_']g'Uk UfXYX"

K cf_'gi Va]hh/X'hk YbhnlcbY'f&&XUmg'UZhYf'h\Y'Xi Y'XUhY'k]```bchVY'UWWdhYX'Zcf'a Uf_]b['cf'ZYYXVUW_UbX'k]```fYWY]j Y'bc'a Uf_'cf'[fUXY"'=Zh\Y'UggYgga YbhHUg_']g'U'Wca di `gcfmWca dcbYbhcZh\Y'Wci fgY'U gh XYbhk]```Ui hca Uh]WU``mZU]`'h\Y'Wci fgY"

GdYWJU`7cbg]XYfUhJcb55dd`]WUhJcbg

 $\label{eq:linear_continuity} $$Mc_i = W_0 - W_$

G]W_bYggža]gUXj Ybhi fY'cf'ch\Yf'W]fW a ghUbWrg'VYmcbX'mci f'Wcbhfc``a Um

ł DfYj Ybhimci Zfca Wca d`Yhlb[U.Wci fqY fYei]fYa Ybhž

ł? YYd mci Zfca 'UthYbX]b['Ub 'UggYggUV`Y 'UWhj]tmž

ł Ghod moi gi Va]hh]b['UggYggUV'Y k cf_ Zcf'U Wci fgYž

ł `G][b]Z]\WbhmUZZY\Wimci f`dYfZcfa Ub\Wr`]b`UggYggUV`Y`k cf_ž`VY`]h'U`Zcfa U``YbX!cZgYa YghYf`Yl Ua]bUh]cbž`U`\WUgg`hYghž`U``UVcfUhcfmihYghž`U`gYa]bUf`dfYgYbhUh]cb`cf`Ubmch\Yf`Zcfa 'cZUggYgga Ybh'

5 WUXYa]W<cbYghmUbX D`U[]Uf]ga

D`U[]Uf]ga `]g`i g]b['h\Y`k cfXg`cf`]XYUg`cZch\Yfg`UbX`dfYgYbh]b['h\Ya `Ug`mci f`ck b"'=hWJb'hU_Y`a Ubm Zcfa gžZfca `XY`]VYfUhY`W\YUh]b['hc`UWW]XYbhU`mWcdm]b['Zfca `U`gci fWY'k]h\ci hUW_bck `YX[Ya Ybh'

IBGK [fcidg'd'U[]Uf]ga]bhc'h\Y'Zc``ck]b[WUhY[cf]Yg.

7 cdm]b[.'i g]b['h\Y'gUa Y'cf'j Yfmg]a]`Uf'k cfXg'hc'h\Y'cf][]bU`hYl h'cf']XYU'k]h\ci h'UW_bck `YX[]b['h\Y gci fW'cf'i g]b['ei chUh]cb'a Uf_g"'H\]g'U`gc'Udd`]Yg'hc']a U[Ygž'Ufh'UbX'XYg][b'dfcYWhgž'Ug'k Y``'Ug dfYgYbhUh]cbg'k \YfY'gca YcbY'dfYgYbhg'Ubch\Yf'g']XYUg'cf'k cfXg'k]h\ci h'WfYX]h'

#JUddfcdf]UhY`dUfUd\fUg]b[.'W\Ub[]b['U'ZYk'k cfXg'UbX'd\fUgYg'k\]'Y`a cghmfYhU]b]b['h\Y`cf][]bU`ghi Whi fY`UbX']bZcfa Uh]cb`k]h\ci h'UW_bck `YX[Ya Ybh''H\]g'U`gc'Udd`]Yg']b'dfYgYbhUh]cbg'k\YfY`gca YcbYdUfUd\fUgYg'Ubch\Yf'g']XYUg'cf'k cfXg'k]h\ci h'WfYX]h''#iU`gc'Udd`]Yg'hc'd]YW]b['hc[Yh\Yf'ei chYg'UbXdUfUd\fUgYg']bhc'U'bYk'k\c`Yž'k]h\ci h'fYZYfYbW]b['UbX'U'ghi XYbhg'ck b'UbU`mg]g'hc'Vf]b['h\Y'a UhYf]U`hc[Yh\Yf'

7 c``i g]cb. 'k cf_]b['k]h\ 'ch\Yfg'Vi h'dUgg]b['cZZh\Y'k cf_'Ug'U'dYfgcb'g']bX]j]Xi U``k cf_"'7 c``i g]cb'U`gc]bWi XYg'dfcj]X]b['mci f'k cf_'hc'Ubch\Yf'ghi XYbhVYZcfY'h\Y'Xi Y'XUhYžcf'Zcf'h\Y'di fdcgY'cZh\Ya d`U[]Uf]g]b['Uh'Ubmh]a Yž'dUm]b['Ubch\Yf'dYfgcb'hc'dYfZcfa 'Ub'UWUXYa]WhUg_ž'ghYU`]b['cf'UWei]f]b[Ubch\Yf'dYfgcb'g'UWUXYa]Wk cf_'UbX'Wcdm]b[']hz'cZYf]b['hc'Wca d`YhY'Ubch\Yf'dYfgcb'g'k cf_'cf'gYY_]b[dUma YbhZcf'Wca d`Yh]b['UWUXYa]Wk cf_"

±bUddfcdf]UhY`W]hUh]cb.`7]h]b[ˈgci fW/gˈk \]WX`\Uj Y`bchVYYb`fYUXžk]h\ci hUW_bck`YX[]b[ˈh\Y`″gYWcbXUfm″gci fW/Zfca k \]WX`_bck`YX[Y`cZh\Ya`\Ug'VYYb`cVhU]bYX"

8 i d`]\WUh]cb`ff`gY`Zld`U[]\Uf]ga "Ł`gi Va]\h]b[`mci f`ck b`k cf_ž]b`k \c`Y`cf`]b`dUfhžk \YfY`]h`\Ug`dfYj]ci g`m VYYb`dfYdUfYX`cf`gi Va]\hYX`Zcf`Ubch\Yf`UqqYqqa Ybhcf\Wci fgY`UhI_BGK_`cf`Ubch\Yf`i b]\Yfq]\m"

7 cffYWhfYZYfYbWb[dfUWhWyg.

• Dufud\fug]b[žgi a a Uf]g]b[žYggUmk f]h]b["UbX"h]a Y"a UbU[Ya Ybh

•

- VYMYfa UbU[Ymcifh]a Y
- i bXYfgHJbX'mci f'f][\hg'UbX'fYgdcbg]V]`]h]Yg'Ug'U'ghi XYbh'Uhi BGK
 VY'Uk UfY'cZd`U[]Uf]ga ž'Wcdmf][\hž'I BGK 'Ghi XYbh'7cXY'cZ7cbXi Wh'UbX'5WWYdhJV`Y'I gY'cZ I BGK '= H'F Ygci fWfg'Dc`]Wh

7ci fgY GWXYXi `Y

J]Yk 'WUgg'ha YHUV'Y

H]a YtUV`Y

8UhY	HmdY	7 cbhYbh
K YY_'%'&*': YVfi Ufm!'(@YWh fY	K YY_'%
A UfW		6YZcfY``YWn fY'%!'a UbXUhcfm
		@Uk gcbžK "'f&\$\$, Ł"'8Yj Y`cd]b['WcbWdhg'cZh\Y Ui hlgh]WUbX'md]WU`'gdYWfi a g"'±b'5a` UWbfe aX @ad_ S{fk, FZW3gf[ef[US`V Fkb[US^EbWUfdy_ ftld" '%(' Ł"'@cbXcb.'>Ygg]WU'?]b[g`YmDi V`]g\Yfg" ł7\UdhYf'&"
		5ZYf~YWn fY~%!~a UbXUhcfm
		@Uk gcbžK "'f&\$%%±"'7c[b]hjjY'H\Ycfm'H\YcfmcZ A]bX"'±b'FZWbSee[a`SfW_ [Vž: ai bWab'Wi [fZ Sgf[e_ WSd fdd"'((!*(Łž@cbXcb.'>Ygg]WJ'?]b[g'Ym DiV`]g\Yfg"†7\UdhYf')"
		5ZhYf``YWhifY`%'!`cdh]cbU`.
		@ bhcbž?": "ž?fWY_žH"'9"žGYbgi]ž@"A "ž/ 'Gd]`Yfgž >"'@"f&\$%(L"'Cd]b]cbg'cZdYcd'Y'k \c'gY'Z]XYbh]Zm k]h\'Ui h]ga 'UbX'5gdYf[Yf'g'cb'8GA!) 'Wf]HYf]U"' D WeWSdJZ a` EaU[S^I ad] BdSUf[UW'\$&fWLZ'*+!++" 8 C = '%\$"%%++#%\$(-+'%)%(-)()+"
K YY_"&.") "A UfWX"! "%%	@YWhi fY	K YY_'&
A UfW		6YZcfY``YWnifY`&!'aUbXUhcfm
		A Ungcbž>"'@'ž5XUa gž<"'@'žK]``]Ua gž@'`K "ž/F]Yg_YžF"'8"'f&\$% Ł"K \mUfY'h\YfY'gc'a Ubmibgi VghUbh]UhYX'hfYUna Ybhg']b'Ui h]ga 3'DWeWSdUZ['3gf[e_ EbWUfdg_ 6[eadvWdež)f1 Łž(**!(+("\hnd.##XI"Xc]"cf[#%\$"%\$%*#"fUgX"&\$%&"%%"\$\$*
		5B8
		HfUj Yfgž'>"7" f&\$%+Ł" '9j U`i Uhjb['WU]a g'hc'Uj c]X dgYi XcgWjYbhjZjWUbX'i bdfcj Yb'dfUWfjWYg']b'gdYWjU` YXi WUhjcb";`fWthW f[a` [EUZaa^S`V 5 1 [U ' \$f(Łž %)-&\$' "'8C = '%\$"%%++#%\$)'()%&%**)-(**
		5ZHYf``YWhifY`&!'cdh]cbU`.
		A W8cbU`XžA "`9"žDUWYž8"ž6`i Yž9"ž/ 'GW.k Ufmž

	8 "`f&\$%&{"`7 f]h]WU``]ggi Yg`]b`WUi gUh]cb`UbX hfYUha YbhcZUi h]ga .`K \mZJXg`Wcbh]bi Y`hc Zci f]g\"`5 Z[V`` 8S_ [k 4 WZSh[adFZWcSbkł %&f(Łž &-\$!'\$(" \hd.##XI "Xc]"cf[#%\$"%\$, \$#\$+' %+%\$+"&\$%&"+' &, (-

		5 `gUmYX\UggUbž'6"ž'6UbXUž8"F "ž/; f]ZZ]b!G\]fYmž B " f&\$%* L" 5 fYj]Yk 'cZd]Wi fY YI W\Ub[Y Wca a i b]\Wlipcb]bhYfj Ybh]cbg]a d`Ya YbhYX'Vm dUfYbhg'UbX'dfUWl]h]cbYfg" 5 Z[V * 8S_ [k 4WZSh[ad FZWcSbkł %* f1 Lž'%- % &\$, "'8C = %\$"%\$, \$#\$+' %+%\$+"&\$%*"%&\$' %') C F GUa ž'5"A "ž? i W\UfWhm_ž'G"ž/ 'K UhYfgž'J " f&\$%+L" C b`]bY hcc`g`hc`gi ddcfhh\Y`XY`]j YfmcZYj]XYbWY! VUgYX'dfUWl]\Wg`Zcf'ghi XYbhg`k]h\ '5 G8" F7 35: ;@9 7 j UWbf[a` S^5 Z[VdW l'" f1 Lž'%(% 1%) &"
K YY_').'&*'A UfW\'!'% 5df	@YWhi fY	K YY_')
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		; fUbX]bž'H"'f&\$\$-Ł"'@YUfb]b['Ya dUh\m'9a ch]cb'UbX Ui h]ga "'FZ[] [Y [b[UfgdWe'fdd"', (!%\$\$Ł" 6`cca gVi fmDi V`]g\]b["'+7\UdhYf'("
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K YY_'+. %' '5df]''! && @YVW fY 5df]	3gf[e_ 27] b'S[[Y fZWW [Y_ S fdd"% - 1% 92" 6"UW_k Y" Di V"]g\]b["+7\UdlYf%\$" 5B8 HUJ Uggc"]zH"zA]"Yfz@">"zGWcYbzG"5"z6fci tz">">"zGi "]j Ubz'>"z/ '6Ufcb!7c\YbzG"f&\$%+t"GYbgcfm YUWf] JmzYa d\Uh, jn]b[UbX grghYa]n]b[]b Ui hjga gdYWfi a 'WcbX]ncbg'UbX gYbgcfmdfcWgg]b[X]gcfXYf" 6 WWab_W 15-5aY [ff]hW @WgdaeU[W UW \htd.#XI "Xc]"cf[#%\$"%\$%" #"XWb"&\$%+"\$) "\$\$). 5ZhYf"YWi fY'* 'I cdh]cbU'. 6Uffcbz9"9"zFY]WXck z'6"zGWkb]mz5zGa]h\z"=7"z/GYYfcW.28"fk\$%} t"5 grghYa UhWYy JYK 'czgYbgcfm VUgYX 'HYUha Ybhg 'ZcfW,]XfYb'k]h\ X]gUY]]h'Yg": D Wew6dZ [6 WWab_W 15^6[eST[ff[Wei %)] "(!, \$" \htd.#XI "Xc]"cf[#%\$"%\$%" #"f[XX"&\$%("%%\$\$")" C F 8 Y6ch\z"?"", "z/ F Ynbc'XgzG"f&\$%+t"5'grghYa Uh]W fYj JYk 'czgYbgcfmtVUgYX'Ui hjga 'gi VhrdYg": D Wew6dZ [3gffe_ E bWl/fd_ 6 [ead/Wei %(z ((-) *"\htd.#XI "Xc]"cf[#%\$"%\$%" #"fUgX"&\$%+"\$%"\$\$) K YY_'+ 6 YZcfY"YWi fY'+1'a UbXUlrcfm 7 UfdYbHYfzD"f&\$%&2'8 JU[bcg]g'UbX'UggYgga Ybh]b Ui hjga 'gdYWfi a 'X]gcfXYfg"3VhS' UWe [? W fS^ : W57Z S' V; fWYWlfgS^6[eST[ff[Wez(ft 12%&9)&-"\htd.#XI "Xc]"cf[#%\$"%%\$, &\$((%&, %&9%&&+*), (5B8 A
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		D]Yfi VW]Z`>"A "`f&\$%* Ł"`A ch\Yfg'`gWUZZc`X]b[hYW\b]ei Yg'i gYX`Xi f]b['d`Um]b`hcXX`Yfg`k]h\`Ui h]ga gdYVVfi a 'X]gcfXYf"'< 6 Wh BZke 6 [eST[1 \$* ž &%+!&') "'8 C ='%\$"%\$\$+#g%\$,, &!\$%)!-()-!,		
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		5ZhYf``YWhifY'-'!'cdh]cbU`.		
		F Yi dYffz 5 " ž 8 YddY Yfz '> " 'A " ž / 'G \ Ufa Už I " 'f&\$%) Ł" 9 bUV Yfg Zcf] bWi g]cb. 'H\Y' dYfgdYWfj Yg cZdUfYbfg cZW\] 'XfYb'k] h\ 'Ui h]ga 'gdYWfi a 'X]gcfXYf"' 3 gefc\$ 'Se[S` <agd %\$.="" %+f\$%lz="" '%'<="" '+'a_um'!="" '8="")!-*"="" ,="" bwu[s^7="" c='%\$"%\$%+#gY"&\$%("%+</td></tr><tr><th>K_YY_' i="" s^axe="" th="" vgusf[a`=""><th>@YWn fY</th><th>K YY_'%\$</th></agd>	@YWn fY	K YY_'%\$
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	5ZhYf``YWnifY'%\$'!'cdh]cbU`. Hi``]gž'7"'5"ž/'NUb[f]``cž'5"'B"'f&\$%' Ł"'GYIiU`]hm YXiWUh]cb'Zcf'UXc`YgWYbhg'UbX'UXi`hg'k]h\'Uih]ga
	gdYWfi a 'X]gcfXYfg" BekUZa'aYk [`fZWEUZaa'ež' ' "fl Łž', **!, +) " 8 C = '%\$"%\$\$&#d]hg"&%+%</td></tr><tr><th></th><th>C F</th></tr><tr><td></td><td>8]Yhf]WXz="z/-GUaY:U!5fcz?"f&\$% L"DUfYbhU]bj c`j YaYbhUbX:UXc`YgWYbhgfWUfYYf'[cU`difgi]h Xif]b['h\Y'dcghgW\cc`'hfUbg]h]cb"'<agd S^aX 3VaMeUW UMz'%(f14z*&&%8., "'\hd.##XI"Xc]"cf[#%\$"% \$%*#*UXc`YgWYbVW"&\$%&"%\$"\$\$-</td></tr><tr><td></td><td>CF</td></tr><tr><td></td><td><pre>< YbXf]W_I z̄'G"'f&\$%) Ł"'5Xc`YgWfbWf"'±b`I a_W S` V Y[d'e i [fZ Sgf[e_ ebWUfdg_ V[eadVWdz̄G`VWdefS`V[`Y ½WWj bWd[W UWe Xda_ WSdk UZ['VZaaV fa a V SYWfdd" ,)!-) Łz̄'@cbXcb.'>Ygg]WU'?]b[g`YmDiV`]g\Yfg" ł 7\UdhYf')"</pre></td></tr><tr><td></td><td>CF</td></tr><tr><td></td><td>DcghžAž< UmaYgž@'žGhcfYmž?"ž@ci[\fYmžH"ž/7UadVY``ž7"'f&\$%(L"'IbXYfghUbX]b['ghU`_]b[VY\Uj]cfg'Vm]bX]j]XiU`g'k]h\'Uih]ga'gdYWfiaX]gcfXYfg'UbX'fYWcaaYbXYX'dfYjYbh]cb'ghfUhY[]YgZcf'gW\cc`'gYh]b[g"'<3gf[e_6Wh6[ead\z'&&ž&*-,-&+\$*"'8C='%\$"%\$\$+#g%\$,\$'!\$%&!%+%&!,</td></tr><tr><td></td><td>CF</td></tr><tr><td></td><td><pre><cb[ž9"F"zeBYY`mž@'z/ @ibXz9"A"'f&\$%) t" 5XXfYgg]b['Vi``m]b['cZghiXYbhg'k]h\'Uih]ga. Gi[[Ygh]cbg'zcf'zJa]`]Yg'UbX'YXiWJhcfg"'</pre></td></tr><tr><td></td><td></td></tr><tr><td></td><td></td></tr><tr><td></td><td></td></tr><tr><td></td><td></td></tr></tbody></table>

		7 f]X`UbXž9"? "ž>cbYgžG"7 "žGhcmYgž; "ž7 Udi h]žD"ž A U[YYž7"5" f&\$%*L": Ua]']Yg``]j]b[ik]h\ Ui h]ga gdYWfi a 'X]gcfXYf. F c Yg UbX fYgdcbg]V]]h]Yg`cZ UXc YgWbhg]ghYfg" 8aUge a` 3gf[e_ S` V A fZWd 6 WhWab_ W fS^6 [eST[{f[Wel #f1 Lz%* * -&\$+" 8C = %\$"%%++#%\$, , ') +*%)), ' (** C F @Ub[UbžA "'f&\$%%L" DUfYbhU`j c]Wg`UbX Wbhfcj Yfg]Yg`]b 5i h]ga "'6 [eST[{fk ` E aU[Wfkl \$(l %'!&\$)" 8C = '%\$"%\$, \$#\$-*, +) "&\$%") ((\$) - 5 ZhYf``YWfi fY '%%! cdh]cbU`. A mYfgž6"'>"žA UW_]bhcg\žJ"'<"ž/; c]b!? cWXY`žF" D"'f&\$\$-L""A m[fYUhYgh'cmUbX'a m[fYUhYgh\YUfh UWXY."DUfYbhg'ck b'k cfXg'cb\ck '\Uj]b['U'W]X`]b h\Y'Ui n]ga 'gdYWfi a '\Ug'UZYWfYX'h\Y]f``]j Yg'UbX h\Y]f`ZJa]']Yg'``]j Yg"'D WeW\$dJZ [` 3gf[e_ E bWUfcb_ 6 [eadVWbz'%f1 Lž*+\$!*, (" C F A ci nci fci ž7"zGUbhcgžF"'A "ž/; UZZbYnž'>"'G" f&\$\%\L"5h\ca Y'k]h\ X]gUV]`]m C bY ZJa]`mg'h\fYY [YbYfUh]cbg'bUffUhY'Ui h]ga ";` fWd Sf[a` S^ <agd s^ax<="" th=""></agd>
K YY '%&.'&%'A Um!'&+	@YWhifY	C gS (ffSf[hWE fgV[We [7 VgUSf[a` ł \$&ff* łž* - ' ! +%) " 8 C = '%\$"%\$, \$#\$-) % ' - , "&\$%\$") &- , (% K YY '%&
A Um		6 Y ZcfY "Y Wi fY '%&'! 'a Ub X Uhcfm A] hcbž8 "ž/ 'G]a gžH" 'f&\$%* L'' < ck ']g'U'gYbgY'cZ k Y"! VY]b['Ub X'VY`cb[]b['Wcbghfi WhY X']b'h\Y UVWci bhg'c Z Ui h]gh]WUXi hg3" '6 [eST[/ffk * E a U[Wfkł %#f(Lz') &\$!) ' (" \htd. ##XI "Xc]"cf[#%\$"%\$, \$#\$-*, +) "&\$%*"%, *) &-5B8 < k Ub[ž'M'="z': c`Ymz'? "F "ž/ 'Hfc``cfz'>"B "'f&\$%+L" 5[]b['k Y``cb'h\Y'Ui h]ga 'gdYWfi a . 'H\Y dYfgdYWf] Yg'c Z Ui h]gh]WUXi hg'Ub X'WUfYfg"'; fWd Sf[a` S^BekUZaYWd[Sfd[Ueł \$+fl&Lz'&\$' '!&\$(*" 8 C = %\$"%\$%+#G%\$(%*%\$&%+\$\$%) &% 5 ZhYf`YWi fY '%&'! 'cdh]cbU`. K Y\a Ubž'D"z'6fcc_Yz'J "z'6fcc_Yz'5"A "z'< Ua z'K "z' GW\U`z'7"z'A W8cbci [\z'>"z'@Ui z'G"z'GYk UfXz'<"z'

5j Y``cbYž'@''`f&\$%*Ł'''9a d`cma YbhZcf'UXi``hg`k]h\ Ui h]ga 'gdYWfi a 'X]gcfXYfg.'5'fYhfcgdYWfj Y'fYj]Yk coZfJ'\&i ghcu]sYXo`Ya icizoendYhehhhhpfloolyWhhDe\Ah\hbScelZp [6 WhWab_ W fS^6 [eST[/[f[Wel+' %Z &l+*%]+	proach