

7ci fgY^{*}Cj Yfj]Yk

GHJZ7cbHJWh8YHJ]`g

7cbj Ybcfg

BUa Y	9a U]`	5j U]`UV]`]lm	@cWUh]cb	D\cbY
7 Uh\`YYb`>]b	WUh\`YYb"1jb4 i bgk "YXi "Ui	VmUddc]bha Ybh cb`m		

Hi hcfg

BUa Y	9a U]`	5j U]`UV]`]lm	@cWUh]cb	D\cbY
7 Ut\`YYb`>]b	WUth YYb"1b4 i bgk "YXi "Ui	VmUddc]bha Ybh cb`m		

GWXcc`7cbHJWhi±bZcfa Uhjcb

GWkcc``cZ9Xi WUhjcb 5fhgž8Yg][b'UbX'5fWk]hYWhifY

; fci bX': `ccfž'A cfj Yb'6fck b'6i]`X]b['fl &\$Ł

H. 'Ž * %'f&Ł'- ' ,) '%- ++

9. YXi WUhcb4 i bgk "YXi "Ui

K. \hdg.#kkk "Ufhg"i bgk "YXi "Ui #YXi WUhjcb

5W_bck `YX[Ya YbhcZ7ci bhfm

7ci fgY 8YHJ]`g I b]hg cZ7fYX]h*

K cf_`cUX

ł '7 cj YfYX'Xi f]b['h\Y'Wci fgY

HYUWX]b[GhfUhY[]Yg

FUhlcbU`Y.

 $\label{thm:conditional} $$H\Y'Wc fgY'Wc hYbh'Wc Yfg'U'fUb[Y'cZYggYbh]U''UgdYWg'cZdYXU[c[mgdYW]Z]Whc'h\Y'hYUW\]b['cZ\\ @Ub[iU[Yg'ch\Yf'h\Ub'9b[`]g\']b'gYWcbXUfmgW\cc`g''H\Y'hYUW\]b['UbX'`YUfb]b['d\]`cgcd\mi bXYfd]bb]b[h\]g'Wc ifgY']g'cbY'cZUWh]j Y'Yb[U[Ya Ybh''H\Y'Wc ifgY']g'\][\`m]bhYfUWh]j Yž'fYei]f]b['gh XYbhg'hc dUfh]W]dUhY'VmWcbhf]Vih]b['h\Y]f'YIdYf]YbW'ž_bck 'YX[Y'UbX'g_]`gž'WUffm]b['cihfYgYUfW\ž]bj c`j]b[h\Ya gY`j Yg']b'X]U'c[iY'k]h\Th\Y''YWh fYf'UbX'ch\Yf'gh XYbhg'Vch\']b'UbX'cihcZWUggž'ibXYfhU_]b['gY`Z]fYZYWh]cb'UbX'hU_]b['fYgdcbg]V]`]mmZcf'h\Y]f'ck b''YUfb]b[''H\Y''YUfb]b['hUg_g'dfcj]XYX'k]`''VY'W\U''Yb[]b[\Z\f\Y]\[\mathred{m}U\T\W\W\U''\UbX'fY'Yj\Ubh'hc'h\Y''\Y\W\]b['dfcZYqg]cb''$

HYUWX]b[GhfUhY[]Yg.

Ga U```[fci d`WccdYfUh]j Y``YUfb]b['hc'i bXYfghUbX'h\Y']a dcfhUbW'cZhYUa k cf_']b'Ub'YXi WUh]cbU``WcbhYl h UbX'hc'XYa cbghfUhY'h\Y'i qY'cZ[fci d'ghfi Whi fYg'Ug'Uddfcdf]UhY'hc'UXXfYgg'HYUW\]b['UbX``YUfb]b['[cU`g''

91 d`]WjhihYUW.]b[ž']bWi X]b[``YWi fYgžhc`XYa cbghfUhY`Ub`i bXYfghUbX]b['cZghi XYbhgf33`X]ZZYfYbh UddfcUW.Yg`hc``YUfb]b['UbX`h\Y`i gY`cZU`fUb[Y`cZhYUW.]b['ghfUhY[]Yg`hc`ZcghYf`]bhYfYghUbX`gi ddcfh `YUfb]b["

91 h/bg]j Y cddcfhi b]h]Yg Zcf'k \c`Y'[fci d'UbX'ga U``'[fci d'X]U`c[i Y 'UbX'X]gW gg]cbž'U``ck]b['ghi XYbhg'h\Y cddcfhi b]mhc 'XYa cbghfUhY'h\Y]f'WJdUW]mhc 'Wca a i b]WJhY'UbX'`]U]gY'k]h\'h\YX]j YfgY'a Ya VYfg'cZUb YXi WJh]cb'Wca a i b]mž'UbX'hc'XYa cbghfUhY'h\Y]f'_bck `YX[Y 'UbX'i bXYfghJbX]b['cZa Yh\cX'WcbhYbh'

5ggYgga Ybh

5ggYgga Ybh'hJg_	K Y][\h	8iY'8UHY	7 ci fgY @YUfb]b[Ci hWca Yg 5ggYggYX
%"'GWcdY'UbX'gYei YbW	(\$1	\$) #\$, #&\$&&`\$) .\$\$`DA	&ž¨ ž˙(ž˙)
&"'I b]hcZkcf_	* \$1	&*#\$,#&\$&&`\$).\$\$`DA	%ž˙' ž˙(ž˙*

5ggYgga Ybh% GWcdY UbX gYei YbWY

8i Y'XUhY. '\$) #\$, #&\$&&'\$) .\$\$'DA

7 fYUHY 'U'gWcdY 'UbX'gYei YbWYž]bWi X]b['`YUfb]b['ci HWca Ygž'Wcj Yf]b['%\$'k YY_g'Zcf'U'MYUf' '%'dfY`]a]bUfm WUgg"'DfYdUfY 'Ub'UggYgga Ybh'HUg_'h\Uh'X]fYWhm`]b_g'hc'h\Y'HYUW\]b['UbX'`YUfb]b[']bHYbH]cbg'Zcf'h\Y HYfa 'g'k cf_"'=bX]WUHj Y'Yb[h\. '&\$\$\$'k cfXg"

5XX)hjcbU`XYhJ]`g

 $D5FH \% 7 fYUhY `U`MYUf` \%'dfY`]a]bUfmWci fgY`gWcdY`UbX`gYei YbW'`f6Y[]bbYfg`CF `7cbh]bi YfgŁ'k]h\`UbUggYgga YbkigWXYXi `Y`Vi]`h`]b$

FYZYf'hc bXj]WY'htthftgh/addiddbX'gYei YbWY']'h']b
 \httdg.##YXi Vbticbgh/bXUfXg"bgk "YXi "Ui #k dg#dcfhU'#bYgU#!%\$# bXYfgh/bX]b[!h\Y!
W ff]W 'i a #dfc \fua a]b[#UXi] \text{W!cb!qWcdY!UbX!qYei YbW!q}

I g]b['h\Y'gWcdY'UbX'gYei YbW'dfYdUfYX'Zcf'5ggYgga Ybh%'UbX'h\Y'ZYYXVUW_'fYW']j YXž'dfYdUfY'U'i b]hcZkcf_'Zcf'GhU[Y'*'k\]W\Wcj Yfg'Uddfcl]a UhY'm\U'Zh\Y'hYfa "'+bX]WUh]j Y''Yb[h\.'' \$\$\$'k cfXg"

5 ZYYXVUW_g\YYhk]``VY`dfcj]XYX"

5XX]h]cbU`XYhJ]`g

DfYdUfY'U'i b]hcZk cf_'Zcf''MYUf''&'7 cbh]bi Yfg'C F '6Y[]bbYfg'< G7 'Wci fgY'h\Uh]g'U') 'k YY_'Wci fgY'''Mci bYYX'hc'Ybgi fY'h\Y'i b]hXYa cbghfUhYg'mci 'UfY'fYUXmhc'd'Ub'UbX'hYUW\'GhU[Y'*'YZYWM]j Y`m'A U_Y'gi fY mci '\Uj Y'fYZYWMX'cb'h\Y'ZYYXVUW_'mci 'fYWY]j YX'Zcf'h\Y'gWcdY'UbX'gYei YbW'mci 'dfYdUfYX'Zcf 5ggYgga Ybh'%''

 $\label{thm:czkcf_gho} $$HY''i b]hcZkcf_ghci'X']bX]WUhY'U'j Uf]YhmcZZcfa Uhj Y'UggYgga YbhghfUhY[]Yg'kh]W'k]''dfcj]XY'gh XYbhg k]hh'ZYYXVUW_UVci h$

U"'k \Uh'h\Ym'\\Ub'U`fYUXm'Xc'k Y``

V"k\Uhh\Ymgh]``bYYX hc]a dfcjY

±bWi XY'U``'UWfj]hjYg'UbX'fYgci fWyg'hc'gi ddcfhighi XYbh`YUfb]b["'H\YfY'a i ghVY'Uh``YUgh

- cbY ``]hYfUWnUWnj]hmžUbX
- cby bi a yfuwnc f = H uwj] mž

 $\pm XYg][b]b['h Y''YUfb]b['UWf]j]hYg'Ybgi fY'h Ym'UfY'a YUb]b[Z\'h YfUi h Ybh]WZ'di fdcgYZ\'ff]b_g'hc'h Ygm'UV'g'ci hWca YE'UbX'i gYZ\'ffUbgZYfUV'Y'g_]`gE''$

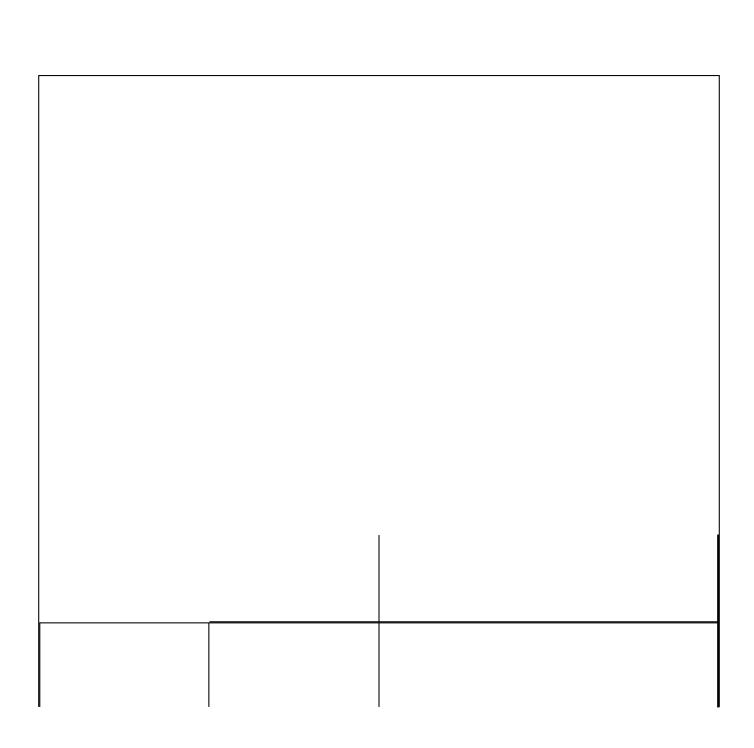
HUg_' . 7ca a cb 5ggYgga YbhA cXi Y

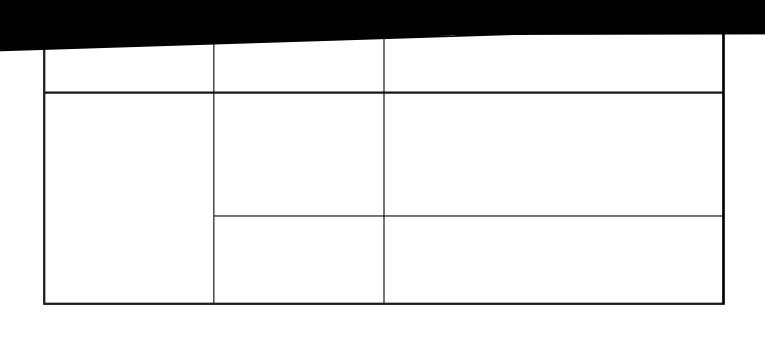
Glfi Wi fY. H\Y'7 ca a cb 5ggYgga YbhA cXi Y'k]``VY'Uj U]`UV`Y'hc'k cf_cb'Zfca 'K YY_'%cZI BGK 'HYfa '&"

K Y][\h'B#5 ffh\]g'U'\i fX`Y'fYei]fYa Ybh'h\Uha i ghVY'Wca d`YhYX'hc'dUgg'h\Y'Wci fgYŁ"

' "K f]hY`U`ZYk```]bYg`h\Uh`Wci`X`VY`]bWiXYX`]b`U`a]X!mYUf`fYdcfh`WcaaYbhihc`dUfYbhg"

flŁ—			2fŽŁ
	'		





F Ygci fWYg DfYgWf]VYX F Ygci fWYg

Gi Va]gg]cb cZ5ggYgga YbhHUg_g

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

Image: Ybwci bhYf'U'dfcV'Ya k \Yb'UhYa dhJb['hc'gi Va]hmci f'Ugg][ba Ybht\fci [\'Hi fb]hJbž'd'YUgY

HY'Yd\cbY'9| hYfbU''Gi ddcfhcb'-',) '' ' ' %cf'Ya U]''h\Ya 'cb'Y! hYfbU'hY'hgi ddcfh4 i bgk "YXi "Ui "''Gi ddcfh
\ci fg'UfY', .\$\$Ua '-'%\$.\$\$da 'cb'k YY_XUmg'UbX'-.\$\$Ua '-').\$\$da 'cb'k YY_YbXg'fl *) 'XUmg'U'mYUfŁ"'=Imci
UfY'i bUV'Y'hc'gi Va]hmci f'Ugg][ba YbhXi Y'hc'U'ZJi 'hk]h\'Hi fb]hJb'mci 'a UmUdd'mZcf'Ub'Y! hYbg]cbž'Vi hmci
a i ghfYhJ]b'mci f'hJW_Yhbi a VYf'Zfca '9! hYfbU''Gi ddcfhfU'cb['k]h\'Ubmch\Yf'fY'Yj UbhXcW a YbhgŁ'hc
]bWi XY'Ug'Yj]XYbW'hc'gi ddcfhmci f'Y! hYbg]cb'Udd']WUhJcb"'=Imci 'Ya U]''9! hYfbU''Gi ddcfhmci 'k]''
Ui hca UhJWJ'`mfYW']j Y'U'hJW_Yhbi a VYfž'Vi h]Zmci 'hY'Yd\cbY'mci 'k]'''bYYX'hc'gdYWJZJWJ'`mUg_'Zcf'cbY''
Hi fb]hJb'U'gc'dfcj]XYg'i dXUhYg'cb'h\Y]f'gmghYa 'ghUh' g'cb'Hk]hYf"

; YbYfU``mž'UggYgga YbhiHug_g'a i gh'VY'gi Va]hhYX'Y`YWfcb]WJ``mj]U'Y]h\Yf'Hi fb]h]b'cf'U'A ccX`Y Ugg][ba Ybh'' = D`]bgHJbWYg'k \YfY'h\]g']g'bchdcgg]V'Yž']hk]``VY'gHJhYX'cb'mci f'Wci fgY'g'A ccX`Y'g]hY'k]h\

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`hJ_Y`a Ubm Zcfa gžZca `XY`]VYfUhY`W\YUh]b['hc`UVW]XYbhJ``mWcdm]b['Zfca `U`gci fWY`k]h\ci hUW_bck `YX[Ya Ybh'

IBGK [fcidgdu[]Uf]ga]bhch\YZc``ck]b[WUhY[cf]Yg.

 $\begin{tabular}{ll} \hline \textbf{7.cdm}b[...] g]b[...] MY cf'j Yfmg]a] ``Uf'k cfXg'hc'h\Y'cf][] bU``HYI hcf']XYU'k]h\ci h`U\W_bck ``YX[]b[...] b[...] MY cf'i g]b[...] bU``HYI hcf']XYU'k]h\ci h`U\W_bck ``YX[]b[...] b[...] MY cf'i g]b[...] a UhYf]U`gž']XYUg'cf'WcbW'dhg'\faca '`U'Vcc_\text{z}'Ufh]WY\text{z} bU'Vcd_\text{z}'Ufh]WY\text{z} bU'Vcd_\text{z}'Ufh]WY\text{z}'Ufh]WY\text{z} bU'Vcd_\text{z}'Ufh]WY\text{$

5 WUXYa]W + DZcfa Uh]cb

8 i Y 'hc 'Yj c'j]b['UXj]\W 'VmBGK '< YU't\ ž'ghi XYbhg'a i gh'\W.Y\<u>V</u>'Zcf'i dXUh\YX']bZcfa Uh]cb 'fY[UfX]b['cb`]bY 'YUfb]b['Zcf'U``'5fhgž'8Yg][b 'UbX'5f\W.]h\Y\ni fY '\wci fgYg't\]g't\Yfa 'f]]U'A ccX`Y'cf'\wci fgY']bZcfa Uh]cb dfcj]\XYX"Ł

: cf`YggYbhJU``gh XYbh`]bZcfa UhJcb`fY`UhJb['hc.

- fYei YghgʻZcfʻYl hYbg]cb/
- `UhY gi Va]gg]cbg [i]XY`]bYg/
- fYj]Yk cZa Uf_g/
- I BGK '< YU`h\ 'UbX'GUZYhm'dc`]W]Yg/
- YI Ua]bUh]cb dfcWYXi fYg/

•