

MUSC1602

A UhYf]U`g`UbX`Ghfi Whi fYg`cZA i g]W%

HYfa 'C bY''##'&\$&\$

7ci fgY'Cj Yfj]Yk

Ghuzz 7 cbhuWh8 Yhu]`g

'7cbj Ybcfg'

B Ua Y	9a U]`	5j U]`UV]`] m	@cWJh]cb	D∖cbY
>c\b'DYhYfgcb	~dYhYfgcb4 i bgk "YXi "Ui	A cbXUm	C Z Z]V Y '%\$) ž	-',) (,+\$
		%%"\$\$Ua!%&"\$\$da/	@Yj Y``%ž'G]f	
		H∖i fgXUm	FcVYfh	
		%%"\$\$Ua!%&"\$\$da"	K YVghYf*6`X[

"@YWhifYfg"

B Ua Y	9a U]`	5j U]`UV]`] m	@cWUhjcb	D∖cbY
>c\b`DYhYfgcb	^dYhYfgcb4 i bgk "YXi "Ui	A cbXUm	C Z Z]V Y '%\$) ž	-',) (,+\$
		‰"\$\$Ua!‰"\$\$da/	@Yj Y``%ž'G]f	
		H∖i fgXUm	FcVYfh	
		%%"\$\$Ua!%&"\$\$da"	K YVghYf*6`X[

'Hi hcfg'

B Ua Y	9a U]`	5j U]`UV]`] m	@cWUh]cb	D\cbY
8Uj]X'HUmcf	gUa 4 i bgk "YXi "Ui	8 Uj]X]g h\Y Hi hcf Zcfh\Y 5 i fU` Hi hcf]U``UbX h\Y 5 i fU``7 \c]fž'UbX`\\ g\ci `X VY WcbHUWY j]U'Ya U]``Uhh\Y Zc``ck]b['UXXfYgg. I Uj]X"Ubh\cbm'HUmcf 4 [a U]"Wca "	×	

GWXcc`7cbHJWhi±bZcfa Uhjcb

Fcca " &ž`Yj Y`" FcVYfhK YVghYf`6i]`X]b[

D\cbY. f\$&£'-',) '(,) *

9a U]`.'gUa 4 i bgk "YXi "Ui

K YVg]hY. '\hdg.##gUa "Ufhg"i bgk "YXi "Ui

 $\label{eq:hamiltonian} $$HY'GWKcc``cZhY'5ftg'UbX'AYX]U'kci`X``]_Y'tc'FYgdYWZI``m5W_bck`YX[Y'h\Y'HfUX]tjcbU``7igtcX]UbgZhY'6YXY[U'`fPYbg]b[hcb'WJadigŁZ'; UX][U'`fP]hmUbX'5fti/'8Yg][b'7UadigYgŁ'UbX't\Y'B[ibbUkU`dYcd'Y'fbighfU`]Ub'8YZYbWY': cfWY'5WJXYam]b'7UbVYffUŁ'cZh\Y'`UbXg'k\YfY'YUWX'WJadig'cZIBGK']g`cWJhYX''$

7ci fgY 8YHJ] g

7 fYX]hDc]bhg *

Gi a a UfmcZh\Y 7ci fgY

Gi VYWh5fYU. ? ge[U

7 ci fgY @YUfb]b['Ci hWca Yg

%" a UghYf'Zci bXUh]cbU``_bck `YX[Y`cb'h\Y`a UhYf]U`gž'ghfi Whi fYg'UbX'dfcWYggYg'cZhcbU``a i g]W &" Wca dcgY'X]Uhcb]Wa Y`cX]Yg'k]h\ 'Uddfcdf]UhY'\Ufa cb]Wghfi Whi fYg'

- " Udd`mih\Y`Zci bXUh]cbU``_bck `YX[Y`UbX`XYj Y`cd]b[`g_]``g`cb`X]Uhcb]Wa Y`cXmUbX`\Ufa cbmhc UbU`mg]b[`hcbU``Wa dcg]h]cb
- ("Udd`mih\Y]f`XYj Y`cd]b['a i g]\W\`_bck `YX[Y`UbX`g_]``hc`a i g]\Wa U_]b[žk \Yh\Yf`]hVY`dfU\M]\W\`dYf\Zcfa Ub\W`cf`\Wca dcg]hicb`
-) " UWW fUHY`m`]XYbH]Zma Y`cX]WE\Ufa cb]WUbX`f\mt\a]WgHi Wh fYg`dfYgWf]VYX`VmH\Y`5i fU`]U`YUf! HTU]b]b[`Wca di HYf`dfc[fUa

HYUW]b['GhfUhY[]Yg'

6A i gʻghi XYbhgʻUhhYbXʻUʻk YY_`mcbY!\ci fʻʻYWhi fYʻcbʻa i g]Wh\Ycfm'UbXʻ\Ufa cbmžʻUʻcbY!\ci fʻhi hcf]U``Ui fU` hfU]b]b['k cf_g\cdž'UbX`UʻcbY!\ci fʻUi fU``W\c]fʻWUgg"``65 ghi XYbhgž'Vch\`A i g]WGhi X]YgʻUbX`A i g]WGhi X]Yg 9I hYbg]cbʻWUbX]XUhYgžʻ`UhhYbX`Uʻk YY_`mcbY!\ci f``YWhi fYʻcbʻa i g]Wh\Ycfm'UbX`\Ufa cbmžʻUʻcbY!\ci fhi hcf]U``cbʻa UhYf]UʻgʻfY`UhYX`hcʻh\Y`h\Ycfm`YWhi fYžUbX`UʻcbY!\ci f``Ui fU``W\c]f`WUgg"

@YWN fYg`UfY`Ui [a YbhYX`k]h\`gci bX`fYWcfX]b[gždckYfdc]bhdfYgYbhUh]cbgžUbX`WUgg`ei]nnYg"`5i fU` ffU]b]b[`k cf_g\cdg`]bhYbg]j Y`Xf]``g`UbX`YI YfW]gYg`XYg][bYX`hc`XYj Y`cd`Ui fU``dYfWdh]cb/Ui fU``W\c]f gi ddcfhg`Ui fU``hfU]b]b[`h\fci [\`g][\hg]b[]b[`UbX`XYj Y`cd]b[`d]hW\`UWW fUWh'`65`hi hcf]U`g`]bj c`j Y`WUgg YI YfW]gYg`UbX`Ugg][ba Ybhg`cb`a i g]Wh\Ycfmž\Ufa cbmUbX`Wca dcg]h]cbž'Ui fU``UbU`mg]g`cZgY`YWHYX a i g]WU``YI Ua d`YgžXYa cbghfUh]cbgž'UbX`\UbXg!cb`dfUW]WU``k cf_"

5ggYgga Ybh

± cfXYf hc dUgg h\]g Wci fgYžgh XYbhg a i gha U_Y U gYf]ci g UhYa dhUh5@UggYgga YbhhUg_g" H\]g]bWi XYg h\Y gY \ZX]fYWhYX f5 i fU\]UfiUggYga Ybhz UbX h\Y 5 i fU``7 \c]f fGh X]c L UggYgga Ybh'

- : U]i fY'hc'UhhYa dh'U``'UggYgga YbhhUg_gž'cf'ZJ]i fY'hc'UWX]Yj Y'U'DUgg'a Uf_'Zcf'h\Y'< Ufa cbm'UbX 7 ca dcg]hJcb'DcfhZc`]cž'WJb'fYgi 'h']b'U'gh XYbhfYWY]j]b['U'fi U]`fi; fUXY'Zcf'h\Y'A I G7'%*\$&7 ci fgY"
- •'5```UggYgga Ybh']hYa gžk]h\`h\Y`YI WYdh]cb`cZ]b!WUgg`hYghgža i ghVY`gi Va]hhYX`j]U`A ccX`Y''`: i fh\Yf XYhJ]`g`UVci hih\Y`gi Va]gg]cb`cZdUfh]W``Uf`UggYgga Ybh']hYa g`k]```VY`]ggi YX`Uhj Uf]ci g`h]a Yg`Vmh\Y fY`Yj Ubh'hi hcf`cf``YWhi fYf`]b`h\Y`A I G7'%*\$&`A UhYf]U`g`UbX`Ghi Whi fYg`cZA i g]W%'7ci fgY''`D`YUgY`hU_Y YgdYW]U``bchY`cZXi Y`XUhYg`UbX`h]a Yg`Ug`@UhY`DYbU`h]Yg`UfY`Udd`]YX`Ui hca Uh]WU``mVmh\Y`A ccX`Y Gi Va]gg]cb`gmghYa `]a a YX]UhY`mUZhYf`h\Y`XYg][bUhYX`gi Va]gg]cb`h]a Y`\Ug`dUggYX''`

5ggYgga YbhHUg_g

5ggYgga Ybh'hJg_	K Y][\h	

 $\label{thm:local} $$W$ a d'YhY'a Y`cX]WUbX'f\mh\a]WX]WUh]cb'Yl YfW]gYg.'h\]g'Ug'Ub'UVgc`i hY'a]b]a i a 'fYei]fYa Ybh'Zcf'5@ghi XYbhg''$

5ggYgga Ybhi]gʻVUgYXʻcbʻh\YʻZc``ck]b[i]hYa g.

%"FY[i`Uf'igY'cZ5ifU`]U`UbX`fUhY'cZDfc[fYgg'h\fci[\'U'k]XY`fUb[Y'cZYUf!hfU]b]b['9|YfW]gYg'k]``VY'acb]hcfYX'h\fci[\cihh\Y'HYfa'!'U```gh XYbhg'UfY'YldYWYX`hc'VY'ig]b['h\Y'gcZhkUfY'Zcf'U'a]b]aiacZhkc'\cifg'dYf'kYY_"'Kcfh\')ı cZh\Y'hchU``aUf_'Zcf'h\Y'WtifgY"

&"`5i fU`]U`HYgh`h\]g`cb\$`]bY`hYghk]``VY`a UXY`Uj U]`UV`Y`Zcf`Wca d`Yh]cb`Xi f]b[`U`g\cfhdYf]cX`cZh]a Y`]b K YY_-"K cfh\"%i `cZh\Y`hchU``a Uf_Zcf`h\Y`Wci fgY"

5 hmy b X Ub WY F Yei] f Ya Yb hg

5 MY b X U b WY c Z @Y W i f Y g ž H i hc f] U `g `U b X `G h `X] c g `] g `a U b X U hc f m] b `h \] g `W c i f g Y " I b Y I W g Y X `U V g Y b W `Z f c a c f Y `h \ U b `&\$ i `c Z W U g g Y g `a U m f Y g i `h] b `h Y `U k U f X `c Z U : U] `; f U X Y "

@97 HI F 9.]b ``YWi fYg'mci 'k]```UWij Y`miYb[U[Y`k]h\ 'WcfY'Wci fgY'WcbhYbh'h\Uhk]```\Y`d'mci 'hck UfXg'h\Y UhtU]ba YbhcZU'a UghYfmcZh\Y'Zci bXUh]cbU``_bck `YX[Y'cb'h\Y'a UhYf]U`gžghi Wi fYgžUbX'dfcW/ggYg cZhcbU``a i g]Wf7 @C '%±z'hc'Wca dcgY'X]Uhcb]Wa Y`cX]Yg'k]h\ 'Uddfcdf]UhY'\Ufa cb]Wghfi Wi fYg'f7 @C '&±žUbX hc'Udd`mh\]g'_bck `YX[Y'hc'h\Y'UbU`mg]g'cZhcbU``a i g]W]b'U'j Uf]YhmcZghm`Ygž]bWi X]b['dcdi `Uf'a i g]WUbX Unn'f7 @C '' ±"

GHI 8 €.]b gh X]cg mci k]``UWhj Y`mYb[U[Y'k]h\'WcfY'Wci fgY'WcbhYbhh\Uhk]``\Y`d mci 'Udd`mmci f'Ui fU` UbX'h\Ycfmg_]`g hc'a i g]Wa U_b['i]]U'dYfZcfa UbW'f7 @C '(Ł"

7ci fqY'GWXYXi `Y

J]Yk 'WUqq'ha YHUV'Y

H]a YtUV`Y

8UhY	HmdY	7 cbhYbh
K YY_`%`%+`: YVfi Ufm!`&% : YVfi Ufm		<ur> Ufa cbm@YWh fYg. H\i fgXUm&\$:: YVfi Ufm Uh % "\$\$da hc %" \$da žUbX &"\$\$da hc " \$da ž]b K YVghYf@YWh fY F cca ; %+" 7 cbhYbh *bhfcXi Whcb hc h\Y Wci fgY UbX fYj]g]cb cZ gWU Ygž]bhYfj U`gžhf]UX]Wghfi Wh fYgžF ca Ub Bi a YfU`UbU`mh]WU`bchUh]cb" Gi [[YghYX F YUX]b[. 7 YbX]bb]b[/ A Ufj]bHYI hVcc dU[Y bi a VYfg fYZYf hc fX YX]h]cb </ur>

		@]ghYb]b['Zcf'K _'&.'GhfUj]bg_m BWfdgeZ] SN#+##@
		< ca Yk cf 'DfYdUfYX'g]b[]b['fl⁄cf'5i fU`'7 \c]fŁ
	@YVVi fY	< Ufa cbm@YWi fYg. H\i fgXUm&+': YVfi Ufm'Uh %&"\$\$da 'hc'%"' \$da ž'UbX`&"\$\$da 'hc ' "' \$da ž']b K YVghYf'@YWi fY F cca '; %+"
		7 cblYbh 'Hf]UXg. ']bj Yfg]cbž'UbU`ml]WU``bclUl]cb" 'H\Y Hcb]W8ca]bUbhfY`Ul]cbg\]d" '8ca]bUbh+h\ 'W\cfXg UbX`]bj Yfg]cbg" 'H\Y 'WcbW'dhcZfjic]W! 'YUX]b[f'i
		Gi [[YghYX F YUX]b[. "HYI hVcc "dd" "% ' !% - ž'dd" %(, !%) \$ž'dd" "%) ' !%) (ž'dd" "&)) !&* \$"
K YY_" ."&"A UfVX"!"* A UfVX	Gh X]c	5 i fu``7\c]f. `A cbXUmž`\$&`A UfVX.`Uh`%&"\$\$da hc`%"'\$da `]b`K YVghYf`F YWjhU``F cca ''' ('f@Yj Y`'' Ł"
		5```gh XYbhg`a i gh'UhhYbX"
	Hi hcf]U`	5i fU`Hi hcf]U`g. K YXbYgXUmž\$(`A UfWX.`UhiY]h\Yf - "\$\$Ua hc`%\$"' \$Ua ž%\$"' \$Ua hc`%&"\$\$da žcf %"\$\$da hc`&"' \$da .`U``\Y`X`]b`K YVghYf`GYa]bUf F cca ; % "
		7 cbhYbh¨; YbYfU`aig]W`]hYfUWm`G]b[]b[ˈk]h\ʻgc`! ZU/AY`cX]WX]WUh]cbʻ≠'5ifU``UbU`mg]g"
		@]ghYb]b['Zcf'K _'' .'GhfUj]bg_m BWfdgeZ] S N#+##@AcnUfh DWcg[W_ [6?[ad=(\$(N#)+#0
		< ca Yk cf 'DfYdUfYX'g]b[]b[
		< ca Yk cf '5i fU`'5bU`mg]g`Yl YfW]gY`X]ghf]Vi hYX fBi Y`: f]XUm'&\$`A UfW\!`YbX`cZK YY_`)Ł"
	@YWi fY	< Ufa cbm@YWi fYg. H\i fgXUm\$) A UfW. Uh %%"\$\$da hc %" \$da žUbX &"\$\$da hc ' "' \$da ž]b K YVghYf@YWi fY F cca ; %+"
		7 cbH/bh·7 UXYbW/gž\Ufa cb]Wdfc[fYgg]cb"·H\Y 7 UXYbHJU``*#("`A Y`cXmUbX`B cb! < Ufa cb]WHcbYg fWŁ"·5bU`mg]g"
		Gi [[YghYX F YUX]b[. "HYI hVcc "dd" "% %1 % +ž'dd" &' &! &' ' /dd" &+*!&+-/dd" "&,)!&, +/dd" "&- ,!' \$("
		Gi [[YghYX`FYUX]b[`!`Bcb! <ufacb]w HcbYg.`HYI hVcc`dd"`' &%' (' "</ufacb]w
K_YY_"(."-"A_UfVX"!"% A_UfVX	Gh X]c	5 i fu``7\c]f. `A cbXUmž`\$- `A UfVX. `Uh'%&"\$\$da hc`%" \$da `]b`K YVghYf`F YWjhU``F cca '' ' (`f@Yj Y`'' Ł"
		5```ghi XYbhg`a i gh'UhhYbX"
	Hi hcf]U`	5 i fu``Hi hcf]U`g.`K YXbYgXUmž'%%A UfWX.`Uh'Y]h\Yf

K YY_`). `%* `A UfWX`! `&\$ A UfWX	@YWinfy Ghi X]c Hi hcf]U`	- "\$\$Ua 'hc '%\$"' \$Ua z %\$"' \$Ua 'hc '%&"\$\$da z cf %\$\$da 'hc '&"' \$da .'U``\Y'X']b'K YVghYf GYa]bUf F cca '; % " 7 cbhYbh '@jghYb]b['ei]n'f]b! WUggt/F \mh\a]W X]\WUjhcb/HfUbg\Vf]dhjcb dfYdUfUhjcb/5i fU''UbU'mg]g @jghYb]b['Zcf'K _'(.'8YVi ggm'8 f\\& YS'S' f\\& fGYh\\& '% - \% DUI 'Y Y f'U]bYQ'A U\'Yf. Ek_ bZa`k @az & 0% \$\\Q\ < ca Yk cf''DfYdUfYX'g]b[]b[" < Ufa cbm@Y\\f' fYg. 'H\i fgXUm\\&'A UfV\\.'Uh \\&"\$\$da z']b'K YVghYf'@Y\\i fY'F cca '; %+" 7 cbhYbh'A Y'cXmUbX'Bcb! < Ufa cb]\\WHcbYg'f\\'Yg\'g'' \[Gi [[YghYX'FYUX]b[.'HY! f\\'Cc'dd"' \&\\'' \'' 5i fU''7\c]f. 'A cbXUn\\\X'* A UfV\\.'Uh*\$\$da 'ic '\"' \$fi fU''7\c]f. 'A cbXUn\\\X'* A UfV\\.'Uh'\\\\\\\\'' \\$'' \\\'' 5i fU''Hi hcf]U'g. 'K YXbYgXUn\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\
	@YWhi fY	<pre></pre>

		H<9F9°5F9°BC°51F5@'HLHCF±5@G'H<±6 K99?"
	@YWhifY	 Ufa cbm@YWi fYg. 'H\i fgXUm&* 'A UfW\. 'Uh %"\$\$da 'hc'%" \$da ž'UbX'&"\$\$da 'hc "" \$da ž']b K YVghYf @YWi fY F cca '; %+"
		±o!WUgg'hYghff*\$'a]bi hYg'Xi fUh]cbŁ'aUhYf]U``ZfcakYY_g'%!('hYghYX"
		: i fh\Yf`k cf_`cb`W\fca Uh]W\Ufa cbmUZhYf`h\Y`hYgh'
K YY_`+.'' \$'A UfVX'!'' 5df]`	Gh X]c	5i fU`7\c]f. `A cbXUmž' \$`A UfWX. `Uh'&;"\$\$da hc`%" \$da `]b`K YVghYf`F YWjhU``F cca '' ' (`f@Yj Y``' Ł"
		5```ghi XYbhg`a i gh'UhhYbX"

I		< ca Yk cf_, 'DfYdUfYX'g]b[]b["
	@YWn fY	<ur>Ufa cbm@YWhi fYg. H\i fgXUm\\$- '5df]`.'Uh%"\\$\da i\c\" \\$\da z\UbX\&"\\$\da hc\"""\\$\da z\]\b\K\Y\\gh\f\@\Y\\hi\i\f\\F\\ca\;\%+"</ur>
		7 cbH/bh 8]gW gg]cb cZWta dcg]h]cb Ugg][ba Ybh 7 ca dcg]b[a i g]W < Ufa cb]W dfc[fYgg]cbž < Ufa cb]WF \mh\a " D\fUgY ghfi Wi fY UbX 7 UXYbW"
		Gi [[YghYX F YUX]b[. "HYI hVcc "dd" "&(+/dd" '' *-"
K YY_''%' '5df]`!'%+	Gh X]c	5i fU`7\c]f. 'A cbXUmž%' '5df]`
5df]`		81 9 HC H< 9 95GH9F A CB85MDI 6@=7

		G][\HG]b[]b['HYgh'
	@YWhifY	Ufa cbm@YWi fYg. H\i fgXUm&' '5df]`
		H<9F9'5F9'BC'<5FACBM'@97HLF9G'H< € K 99?'!'ghi XYbhg'g\ci `X'i gY'h\Y'h]aY'hc'k cf_'cb UbX'Wcad'YhY'h\Y]f'Wcadcg]h]cb'Ugg][baYbhg'!'XiY ("\$\$da'AcbXUm'&+'5df]'"
K_YY_'%%'&+'5df]`'!'&, 5df]`	Gń X]c	5i fU``7\c]f. A cbXUmž&+`5df]`. Uhi‰"\$\$da hc`%" \$da `]b`K YVghYf`F YW]hU``F cca '' ' (`f@Yj Y``' Ł" 5```gh XYbhg`a i gh'UhhYbX"

k YY_`mgW\YXi `Yg`Zcf`YUW\`Wca dcbYbHz`]b`cfXYf`hc`Z fh\Yf`Wcbgc`]XUhY`h\Y`gh XYbhg`i bXYfghUbX]b[`cZh\cgY`WcbWYdhg"`5`gcž`Z fh\Yf`UhhYa dhg`\Uj Y`VYYb`a UXY`hc`Ybgi fY`h\Uhgh XYbhg`\Uj Y`UWWYgg`hc`fYj]g]cb a UhYf]U`žYgdYWJU``mj]U`h\Y`A ccX`Y`k YVg]hY"

Gi Va]gg]cb cZ5ggYgga YbhHUg_g

Gi Va]gg]cb cZ5ggYgga YbhHUg_g

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

#mci YbWci bhYf'U'dfcV'Ya 'k \Yb'UthYa dr]b['rc'gi Va]hmci f'Ugg][ba Ybht\fci [\'Hi fb]r]bž'd'YUgY
hY'Yd\cbY'9I hYfbU''Gi ddcfhcb'-',) '''' %cf'Ya U]''h\Ya 'cb'YI 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'mYUft\"'=\maintention
UfY'i bUV'Y 'rc'gi Va]hmci f'Ugg][ba YbhXi Y'rc'U'ZJi 'hk]h\'Hi fb]r]b'mci 'a Um'Udd'm\Zcf'Ub'YI hYbg]cb\ZVi hmci
a i ghfYhJ]b'mci f'r]\W_Yhbi a VYf'\Zfca '9I hYfbU''Gi ddcfhfU'cb['k]h\'Ubmch\Yf'fY'Yj UbhXcW a Ybfg\L'rc
]bWi XY'Ug'Yj]XYbW' 'rc'gi ddcfhmci f'YI hYbg]cb'Udd']\WJh]cb'''=\maintention
UfY'' bUYY''mfYWY']j Y'U'r]\W_Yhbi a VYf\Zfvi h]Zmci 'hY'Yd\cbY'mci 'k]'''bYYX'rc'gdYW]\ZfwJ''mUg_'Zcf'cbY''
Hi fb]h]b'U'gc'dfcj]XYg'i dXUhYg'cb'h\Y]f'gmghYa 'gfUh' g'cb'Hk]hYf"

; YbYfU``mž'UggYgga YbhiHug_g'a i ghVY'gi Va]hhYX'Y`YVWfcb]\W)``mij]U'Y]h\Yf'Hi fb]h]b'cf'U'A ccX`Y Ugg][ba Ybh'' =b']bgHJb\W'g'k \YfY'h\]g']g'bchdcgg]V`Yž']hk]``'VY'gHJhYX'cb'mci f'\\ci fgY'g'A ccX`Y'g]hY'k]h\ U`hYfbUh]j Y'gi Va]gg]cb'XYhJ]`g''

cfi]bZcfa Uh]cbicbi\ckihcigi Va]hUgg][ba Ybhgicbi]bYij]UiA ccXiY.i\hdg.#gh XYbh'i bgk "YXi "Ui #\ck! qi Va]hUgq][ba Ybha ccXiY

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

D`U[]Uf]ga i]gii g]b[ih\Yik cfXgicfi]XYUgicZch\YfgiUbXidfYgYbh]b[ih\Ya iUgimci fick b"i±i\WbihU_Yia Ubm Zcfa gžZfca iXYi]VYfUhYiW\YUh]b[ihciU\W]XYbhU`m\Wcdm]b[iZfca iUigci f\Wik]h\ci hiU\w_bck iYX[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'dfc YWhgž'Ug'k Y``'Ug dfYgYbhUh]cbg'k \YfY'gca YcbY'dfYgYbhg'Ubch\Yf'g']XYUg'cf'k cfXg'k]h\ci h'WfYX]h'

⇒ Uddfcdf]UhY 'dUfUd\fUg]b[. '7\Ub[]b['U'ZYk'k cfXg'UbX'd\fUgYg'k\]Y 'a cghmfYhU]b]b['h\Y'cf][]bU`ghi Wh fY 'UbX#cf'dfc[fYgg]cb'cZ]XYUg'cZh\Y'cf][]bU`žUbX']bZcfa Uh]cb'k]h\ci hUW_bck`YX[Ya Ybh'H\]g'U`gc Udd`]Yg']b'dfYgYbhUh]cbg'k\YfY'gca YcbY'dUfUd\fUgYg'Ubch\Yf'g']XYUg'cf'k cfXg'k]h\ci h'WfYX]h'UbX'hc d]YW]b['hc[Yh\Yf'ei chYg'UbX'dUfUd\fUgYg']bhc'U'bYk'k\c`Yžk]h\ci h'Uddfcdf]UhY'fYZYfYbW]b['"

7 c``i g]cb.'k cf_jb['k]h\ch\Yfg'Vi hdUgg]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['UhiUbmh]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[`gcifWrg`k\]W\`\UjY`bchVYYb`fYUXžk]h\cihUW_bck`YX[]b[`h\Y`´gYWcbXUfm´gcifWrZfca`k\]W\`_bck`YX[Y`cZh\Ya`\Ug`VYYb`cVhU]bYX"

8 i d`]\WUh]cb`ffgY`Zd`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`UggYgga Ybhcf\Wci fgY`UhI BGK `cf`Ubch\Yf`i b]j Yfg]\m'

7 cffYWnfYZYfYbWlb['dfUWnWyg.

• DUfUd\fug]b[z'gi a a Uf]q]b[z'YggUmk f]hb['UbX'ha Y'a UbU[Ya Ybh

5 WUXYa]W = b Zcfa Uh cb ·

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

- fYei Yghg Zcf Yl 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]bUhcb dfcWXi fYg/
- gdYWJU``Wcbg]XYfUHjcb`]b`H\Y`Yj YbhcZ]``bYgg`cf`a]gUXj Ybhi fY/
- gh XYbhYei]mUbX X]gUV]`]m/
- UbX'ch\Yf'YggYbhJU`'UWUXYa]W]bZcfa UhJcbž'gYY

\hdg.#k k k "Uffg"i bgk "YXi "Ui #W ffYbhgh XYbhg#UWJXYa]W]bZcfa Uf]cb#dfchcWc`g![i]XY`]bYg#

,

∍a U[Y'7fYX]h

Gc`c'DYfZcfa UbWY'A U_]b['&\$%

7F = 7CG

7F = 7CG Dfcj]XYf 7cXY. \$\$\$-,;