

ARTS2818

5i ghfu`]Ub'Dc`]hjWg

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

7ci fgY^{*}Cj Yfj]Yk

`GHJZZ:7cbHJWh:8YHJ]`g`

7cbj Ybcfg

B Ua Y	9a U]`	5j U]`UV]`]hm	@cWUh]cb	D\cbY
< Y`Yb`Df]b[`Y	\"df]b[`Y4 i bgk "YXi "Ui	6mUddc]bha Ybh	A 6 ° %(&	-',)&'(*

GWkcc`7cbhUWh ≠bZcfa Uh]cb

GWXcc``cZGcWJU``GWJYbWYg

Fcca '%) -

7ci fgY 8YHJ] g

7 fYX]hDc]bhg**

Gi a a UfmcZh\Y 7ci fgY

H\]g`Wci fgY`]bfcXi Wg`mci `hc`h\Y`]bgh]h ijcbgždfUWjWg`UbX`df]bV]d`Yg`cZfYdfYgYbHJij Y`XYa cWfUWmUbX \(gh)W\Zk \]h\]b`U`Wca dUfUhj Y`WcbhYl H`Mci `k \]```YUfb`UVci hi\Y`5i glfU`]Ub`Wcbgh]h ijcbU``ZfUa Yk cf_Z`h\Y gYdUfUhjcb`cZdck Yfg`UbX`h\Y`\ X]WJU``gmghYa z`h\Y``″i bk f]hYb`Wcbgh]h ijcb‴``cZ[cj Yfb]b[`Wcbj Ybh]cbgžUbX\i a Ub`f][\hg"`Mci `k]``Wca Y`lc`UddfYWJUhY`5i glfU`]Ub`Y`YWcfU``gmghYa g`UbX`VY\Uj]ci fž'Ug`k Y```Ug`h\Y]bgh]h ijcbg`cZDf]a Y`A]b]ghYfz'7 UV]bYhUbX`dc`]hjWU```YUXYfg\]d"'H\Y`Wci fgY`Wcbg]XYfg`h\Y`fc`Y`cZdc`]hjWU``YUXYfg\]d"'H\Y`Wci fgY`Wcbg]XYfg`h\Y`fc`Y`cZdc`]hjWU``YUXYfg\]d"'H\Y`Wci fgY`Wcbg]XYfg`h\Y`fc`Y`cZdc`]hjWU``YYa Ybhg`cZ5i glfU`]Ub`fYdfYgYbhUhj Y`XYa cWfUWnzUg`k Y``Ug`h\Y`Wcblfcj Yfg]U``]ggi Yg`h\Uhih\YmWcj Yfz`UfY Wca dUfYX`hc`h\Y]f`Wci bhYfdUffg`]b`ch\Yf`Wci bhf]Yg"'H\]g`Wci fgY`]g`dfYX]WUhYX`cb`h\Y`Uggi a dh]cb`h\Uh XYa cWfUWm]g`Z\```cZdUfUXcl Yg`UbX`WcblfUX]Wjcbg`h\UhbYYX`hc`VY`i bXYfghccX`]b`cfXYf`hc`W\Ub[Y`h\Y k cfX"

7 ci fgY @YUfb]b[Ci hWca Yg

- %" Ya d`cmi_YmiVcbWYdhgž'df]bW]d`Ygž'UbX'h\Ycf]Yg']b'UbU`mg]g'cZ_Ymi]bgh]hi h]cbg'cZfYdfYgYbhUh]j Y XYa cWfUWm
- &" UbU`mgY`h\Y`dc`]h]WU``gmghYa `UbX`dc`]h]WU``]ggi Yg`]b`5i ghfU`]U`]b`Wa dUf]gcb`k]h\`h\Y]f`Wai bhYfdUffrg]b`ch\Yf`fYdfYgYbhUh]j Y`XYa cWfUW]Yg`]b``][\hcZ`YUX]b['h\Ycf]Yg`cZXYa cWfUWhUbX`^ gh]WY
- ' "XYj Y`cd`gffi Wfi fYX`UbX`Wca d`Yl `Uf[i a Ybfg`fh\Uh`]bWi XY`fUŁ`Wf]h]WU``Yj U`i Uf]cb`cZWcbWfdfg`UbX]bgh]hi h]cbg`UbX`ffVŁ`UXXfYgg]b[```fYgYUfW\`ei Ygh]cbg`VmfY`Uf]b[`WcbWfdfg`UbX`]bgh]hi h]cbg`fc Yj]XYbWf`]b`5i ghfU`]U`UbX`ch\Yf`Wci bhf]Yg
- ("dfUWjgY`Yh\]WU``gV\\c`Ufg\]d`UbX`XYj Y`cd`U`Wca a]ha Ybh'hc`h\Y`df]bWjd`Yg`cZUWUXYa]W]bhY[f]hm Uddfcdf]UhY`hc`i bXYf[fUXi UhY`ghi Xm]b`dc`]hjWq

HYUWX]b['GhfUhY[]Yg'

F Uh]cbU`Y

H\]g`Wci fgY`]g`XYg][bYX`hc`[]jY`mci `U`gci bX`_bck`YX[Y`cZ`WbhfU``h\Ycf]Yg`UbX`dfUWf]W\g`fYei]fYX`Zcf ghi X]Yg`]b`dc`]nJWJ``gWJYbWYg"'=hk]``Yei]d`mci `k]h\`h\Y`df]a UfmWca a i b]WJh]cbz`h\YcfmUbX`fYgYUfW\`g_]``g hc`YbUV`Y`Z fh\Yf`fYgYUfW\`]b`dc`]hJWg`UbX`]bhYfbUh]cbU``fY`Uh]cbg"`H\Y`Wci fgY`gYhg`ci hhc`Yb[U[Y`UbX dfcj c_Y`X]gWi gg]cb`cZa cXYfb`dc`]hJWg`]b`WcbhYa dcfUfm5i ghfU`]UbX`Wca dUfUhJjY`gYhJb[g"`=hXcYg`gc i g]b[``YWhi fYg`UbX`hi hcf]U`g"Mci `k]```VY`fYei]fYX`hc`UWfJjY`mdUfhJWJdUhY`]b`ga U```UbX``Uf[Y`[fci d`hUg_gž UbX`]b`k f]hJb[`Ugg][ba Ybhg"

HYUWX]b['GhfUhY[]Yq

@YUfb]b['ci hWca Yg'UfY'UXXfYggYX'h\fci [\'U'k YY_`mZcfa UhcZU'lk c!\ci f``YWh fY'UbX'cbY!\ci f'h hcf]U'"

5ggYgga Ybh

 $\label{eq:hamiltonian} $$HY'Z_C^*ck \]b[\ 'HUV'Y'gY'g'ci \ hk cfX'`]a \]hg'UbX'Xi Y'XUhYg'Zcf'hkY'j Uf]ci g'dUfhg'cZUggYgga Ybh']b'hkY'Wci fgYžUh'U'[\ 'UbW'''$

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5ggYgga Ybh HJg_		

j Uf]Uf]cb`]b`h\Y`Zcfa`cZhhcf]U`g`Zfca`k\YY_`hc`k\YY_žUbX`acghghiXYbhg`Z]bX`h\Uhh\YmUfY`UV`Y`hcdUff]W]dUhY`YZZYWf]jY`m]b`gaU``![fcid`X]gWjgg]cbg`]b`dUff]W``Uf"

Hi fb]h]b'gYh]b[.'H\]g'Ugg][ba Ybh]g'gi Va]hhYX'h\fci [\'Hi fb]h]b'UbX'gh XYbhg'Xc'bchgYY'Hi fb]h]b g]a]'Uf]hmfYdcfhg"

5ggYgga Ybh' . 9ggUm

GHJfhXUhY.

8 YHU]`g. Mci 'k]``k f]HY'U'fYgYUfW. YggUmcZ&) \$\$ 'k cfXg'k \]W. 'UXXfYggYg'cbY'cZh\Y'hcd]Wg'X]gW ggYX']b h\Y'YWi fY'UbX'hi hcf]U''dfc[fUa "'H\]g'k]``YbUV'Y'UggYgga YbhcZUWei]fYX'_bck `YX[Y'Ug'k Y``'Ug'ZYYXVUW_cb'k f]h]b['UbX'fYgYUfW.'g_]``g"Mci 'k]``fYWY]j Y']bX]j]Xi U``k f]hhYb'ZYYXVUW_'UbX'U'bi a Yf]WU``[fUXY'k]h\]b h\fYY'k YY_g'cZgi Va]gg]cb"'H\Y'ZYYXVUW_g\YYh#fi Vf]Wk]``'VY'Uj U]`UV'Y'Uhh\Y'ghUfhcZh\Y'Wci fgY'gc h\Uhmci 'WUb'k cf_'hck UfXg'gdYW]ZYX'ghUbXUfXg"H\]g'YggUm]g'h\Y'Z]bU``UggYgga YbhcZh\Y'Wci fgY'"

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

5b YggUmcZUfci bX'&) \$\$ 'k cfXg'a i ghVY'gi Va]hhYX'hc'h\Y'Hi fb]hjb YggUm'Vcl 'Vm'%") - da 'cb'K YXbYgXUm &- '5df]'"'H\YfY']g'bc'\UfXWcdmgi Va]gg]cb'cZh\Y'YggUm''Mci 'k]``'bch'VY'dYbU']gYX'Zcf'[c]b['cj Yf'h\Y k cfX``]a]hž'Vi hid'YUgY'fYa Ya VYf'h\Uh']hjg']a dcfhUbh'hc'VY'gi WW]bWhUbX'hc'Uj c]X'VY]b['`cb[!k]bXYX']b'U`` k f]hhYb'k cf_"'=Zh\Y'Wca a Ybhg'cb'mci f'k f]hhYb'k cf_'UfY'bchgi Z]W]Ybhm\Y'dZ 'žk Y'WJb'cZWci fgY'X]gW gg mci f']XYUg'UbX'ei Ygh]cbg"

9ggUmei Ygh]cbg'UfY'VUgYX'cb'Wci fgY'hcd]Wgz'UbX'U``]ghcZei Ygh]cbg'k]``'VY'dfcj]XYX'hc'gh XYbhg'''Mci 'UfY YbWci fU[YX'hc'i gY'U'gdYWJZ]Whcd]Wcf'hcd]Wg'Ug'h\Y'VUg]g'cZmci f'YggUmz'cf'Ug'WUgY'ghi X]Ygz'cf'Ug Yl Ua d'Yg'''Dcgg]V'Y'k Umg'hc'UddfcUW\'h\Y'YggUmk]``'VY'Wcbg]XYfYX']b'[fYUhYf'XYhU]`']b''YWhi fYg'UbX hi hcf]U'g'''Ghi XYbhg'k]``'fYWY]j Y']bX]j]Xi U`'k f]hhYb'ZYYXVUW_'UbX'U'bi a Yf]WU`'[fUXY'k]h\]b'lk c'k YY_g'cZ gi Va]gg]cb'''H\Y'ZYYXVUW_'g\YYhfi Vf]Wk]``'VY'Uj U]`UV'Y'hc'ghi XYbhg'Uh'h\Y'ghUfhcZh\Y'Wci fgY'gc'h\Uh'h\Ym Wb'k cf_hck UfXg'gdYWJZYX'ghUbXUfXg''

9ggUmgʻgi Va]hh'X``Uh'k]```VYʻdYbU`]gYXʻi bʻYggʻUbʻYI h'bg]cbʻ\UgʻVYYbʻ[fUbh'X`cbʻa YX]WU`cf Wta dUgg]cbUh'Yʻ[fci bXgžʻ[SVhS` UWcZh\YʻXi YʻXUhY"'H\YʻdfYggi fYʻcZch\YfʻWti fgYʻk cf_`]gʻbch UWWYdhUv`YʻUgʻgi ZZWYbh[fci bXgʻZcfʻUbʻYI h'bg]cb"'\dangle a U_]b[`UbmfYei YghZcfʻUbʻYI h'bg]cbžVYʻ[i]XYX`Vm mci fʻck bʻdf]bWjdʻYXʻgYbgYʻcZZJJ]fbYgg"'H\YʻdYbU`hmZcfʻ`UhYʻgi Va]gg]cbʻk]h\ci hdYfa]gg]cbʻ]g'' i 'fcZh\Y dYfZYWia Uf_ŁdYfʻXUm`Uh'Yʻfbch']bWi X]b['k YY_YbXgŁ"@Uh'Y k cf_`k]``bchVY`UWWYdh'X`cbWYʻa Uf_YX Ugg][ba Ybhgʻ\Uj Y`VYYbʻfYhi fbYXžk\Yh\YfʻUbʻYI h'bg]cb`\UgʻVYYbʻ[fUbh'X`cfʻbch'

5 https://bxubwww.Fyei]fYaYbhg

Ghi XYbhgʻUfYʻghfcb[`miYbWci fU[YX'hcʻUhhYbX'U```WUggYgʻUbX'fYj]Yk '`YWhi fY`fYWcfX]b[g"

7ci fgY'GWXYXi `Y

J]Yk 'WUgg'h]a YhUV'Y

H]a YtUV`Y

8 UhY	Hmd Y	7 cbhYbh
K YY_'%'%+': YVfi Ufm!'&%		; YbYfU``]blfcXi Wl]cb. Cf]YblUlljcb UbX ei Ygl]cbg" H\Y``YWi fY`]b'h\]g'k YY_'Wcj Yfg cf[Ub]gUlljcbU``a UllYfg']bWi X]b['h\Y'Wci fgY'ci h]bYz cVYWlj Yg'UbX'cf[Ub]nUlljcb" 5ggYgga Ybh fYei]fYa Yblg'k]```VY`X]gW ggYX`]b`XYlU]'" Hi lcf]U` lija Yg'k]```VY`WcbZ]fa YXz'UbX'cZZ]WY'\ci fg Ubbci bWYX" H\Y``YWi fY'U`gc'dfcj]XYg'Ub'cj Yfj]Yk cZh\Y'5i glfU`]Ub'dc`]lj\WU``gmghYa 'UbX']lg'df]bW]d`Yg"' Hi lcf]U`g'VY[]b']b'K YY_''%" I gYZ ``VUW_[fci bX fYUX]b[']bWi XYg.
		 H\Y'5i glfU']Ub'7 cbghhi hcb '⇒lfcXi Wfcb hc'&%gh7Ybhi fm5i glfU']Ub Dc`]hJWg'žW.UdhYf'%cZ3gefcSfS Baff[Ue [fZW Fi W fkŽ8[cbf5W fgck, A ½; ef[fgf[a`eł @W 5ZS^W YWe'YX"; Ybb'; YZ/cfX'YhU'" fl7 Ua Vf]X[Y.'7 Ua Vf]X[Y'I b]j Yfg]hmDfYggž &\$% Ł
K YY_'&.'&(': YVfi Ufm!'&, ': YVfi Ufm		H\Y'5 i ghfU']Ub Wcbghjhi hjcbU`ZfUa Yk cf 8 Ya cWfUWmUbX`fYdfYgYbhUhjcb"H\Y YWi fY YI d'U]bg'h\Y'ghfi Wi fY'UbX'df]bWjd'Yg'cZh\Y 5 i ghfU']Ub Wcbghjhi hjcbž'UbX'h\Y'K Ygha]bghYf gmghYa 'cZfYgdcbg]V]']mi'H\Y'j Uf]ci g'mdYg'cZ dUf']Ua YbhUfmcZjWYg'UbX'dfcWYXi fYg'UfY'YI d'U]bYX]b'fY'Uhjcb'hc'h\Y'GYbUHY'UbX'h\Y'< ci gY'Ug fYdfYgYbhUhj Y'fUbX'XYa cWfUhjWb']bghjhi hjcbg"'H\Y 'YWi fY'U'gc'YI d'U]bg'h\Y]f'fY'Uhjcb'hc'j Uf]ci g h\Ycf]Yg'cZfYdfYgYbhUhjcbž']bWi X]b['Ui h\cf]gUhjcbž XY'Y[UhjcbžfYdfYgYbhUhjcb'UbX'h\Y'WcbhYghU'Y']XYU cZ'a UbXUhY'"'Mci 'g\ci 'X'VY'UV'Y'hc'ci hjbY'h\Y k Umg']b'k \]W\'h\Y'5 i ghfU']Ub Wcbghjhi hjcb'X]ghf]Vi hYg dck Yf'VYlk YYb'h\Y'Ufa g'cZ[cj Yfba YbhUbX'`]a]hg h\Y'cj YfU`''dck Yf'cZ[cj Yfba Ybh'
		 5`Ub: YbbUž'H\Y'5i ghfU`]Ub'GmghYa 'cZ ; cj Yfba Ybhž7\UdhYf'&'cZ9ahWd _ W'fS`V Ba'[f[Ue [3gefd5'[S'%\$h\'YX"ž'YX"'5`Ub : YbbU'Yh'U'" fGmXbYm 'DYUfgcb'5i ghfU`]Už &\$%' Ł GhYd\Yb' < Uff]b[hcbž'5i ghfU`]Ubg'7 ci `Xb'h

K YY_'' . `&`A UfWX '! `* A UfWX	7 UfY @Ygg UVci hDc`]hJVg3 F YU`m3'žFZW 5 a` hWteSf[a` '(': YVfi Ufm&\$%* ž' \htdg.##\\YWtbj YfgUhjcb"Wta #Ji ghfU`]Ubg!Wti`\ XbHWJfY! Ygg!UVci hdc`]hJWg!fYU``m\)'+) GYdUfUhjcb c Z'dck Yfg 'UbX'h\Y'^1 X]VJU' gmghYa "'H\Y'`YWh fY ci h]bYg'h\Y'k Umg']b'k\]W\ dck Yf]g'X]ghf]Vi hYX'VYhk YYb'h\Y'Ufa g'cZ [cj Yfba Ybh'UbX'\ck 'h\Y'^1 X]VJUfm`]a]hg'h\Y'dck Yf cZdUf]Ua Ybh''H\Y'`YWh fY'Wtbg]XYfg'k\Yh\Yf ^1 X]VJU`'fYj]Yk ']g'Wtbg]ghYbhk]h\'XYa cWfUWhž'UbX']hg fY`Uhjcb'hc'dUf`]Ua YbhUfmgcj YfY][bhm'UbX'h\Y'k]``cZ
	 F mUb 'Hi fbYfž' 'H\Y' <][\'7 ci fhcZ5i glfU']U UbX'Dc']h]WU' GWYbWY. '5 F Yj]gYX <]ghcf]c[fUd\m'UbX'BYk 'F YgYUfW\'5 [YbXU'') 3 gefc\$ '{\$` <agd \$"&="" \$^axba'{f[u\$^e="" (+!'="" *(<="" \'="" \cdot="" f\&\\$%)="" li="" u[w="" uw)=""> 'H\Y'Dc']h]WU' F i 'YVcc 'H\Y'5i glfU']Ub 7 cbgh]hi h]cb'UbX'h\Y' <][\'7 ci fhž'W\UdhYf') cZ3gefc\$ '{\$ Ba'{f[Ue[fZWFi W fk.\^28[def 5 W fgdk, A V; ef[fgf[a`el @W 5Z\$^\W YWe YX"; 'Ybb'; YZZcfX'YhU'" fl7 Ua Vf]X[Y. 7 Ua Vf]X[Y'I b]j Yfg]lmDfYggž'&\% </agd>
K YY_'(.'-'A UfWX'!'% A UfWX	H\Y'i bk f]thYb Webgh]ti h]cb. 7 cbj Ybh]cbg UbX \i a Ub'f][\hg"'H\Y''YWi fY'YI d'cfYg'\ck 5i glfU']U'g'k f]thYb Webgh]ti h]cb cdYfUtYg']b Webt bWi]cb'k]th'j Uf]ci g'Webj Ybh]cbg'UbX'W ghea g" H\Y']XYU'cZUb'i bk f]thYb Webgh]ti h]cb']g'YI d'cfYX h\fci [\ei Ygh]cbg'cZfYgdcbg]V]']m''5'thci [\ 5i glfU']U'g'Webgh]ti h]cb'XcYg'bch]bWi XY'U''V]'''cZ f][\hg'Z'th\Y'<][\'7 ci fh\Ug'i d\Y'X'j Uf]ci g [i UfUbhYYg'Webg]ghYbhk]th'5i glfU']U'g']bhYfbUh]cbU' cV'][Uh]cbg']b'fY[UfX'tc'th\Y'I B'glfi Wi fY'cZ\i a Ub f][\hgZ'UbX'th\Y''YWi fY''cc_g'Uhih\Y'ZUVf]WcZth\YgY dfchYWi]cbg'UbX'\ck'th\YmfY'UhY'tc'a U'ef]fUf]Ub'fi 'Y'' • >c\b'Gi a a YfgZ'DUf']Ua Ybh'UbX
	F Ygdcbg]VY; cj Yfba Ybhž7\UdhYf' cZ 9 ahWd _ W f S` V Ba {f[Ue [` 3gefcs {S %\$h\ YX"žYX"'5`Ub : YbbUž >UbY F cVV]bg UbX >c\b Gi a a Yfg f[GmXbYm DYUfgcb 5i ghfU`]Už &\$% Ł • F cVYfh: fYbW\ž' <i &="" &"="" &\$%)="" 4="" 5i="" 7=""][\hg=""]b=""]b[="" a="" b]hyx?="" ca="" cbhfughg="" dfchyw]cb="" duf]gcbg'="" d{vx(="" e'%(!&%<="" f="" fa="" ghfu`]u`ubx="" h\y="" i="" td="" ub="" ubx="" ufw\="" xca=""></i>

K YY_")."%*"A UfWX"!"&\$ A UfWX	9`YWrcfU``gmghYa g`UbX`VY\Uj]ci f"`H\Y``YWi fY

]blfcXi Wfjcbihcia YUgi fYgʻU[U]bghgYli UʻUbXich\Yf Zcfa gʻcZX]gWf]a]bUhjcbi]bi5i glfUʻ]U" • >Ybb]ZYfʻ7i fhjbžʻʻ; YbXYfžDc`]hjWgʻUbXih\Y FYdfYgYbhUhjcbicZK ca Yb'ž7\UdhYfʻ%icZ 9 ahWdi_ WifS`VBa{ff[Ue['3gefcS{S'%h\ YX"žYX"'5`Ubi: YbbUž'>UbY`FcVV]bgʻUbX >c\biGiaa YfgʻfGmXbYm`DYUfgcbi5i glfU`]Už &\$%' Ł

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DfYgWf]VYX F Ygci fWYg

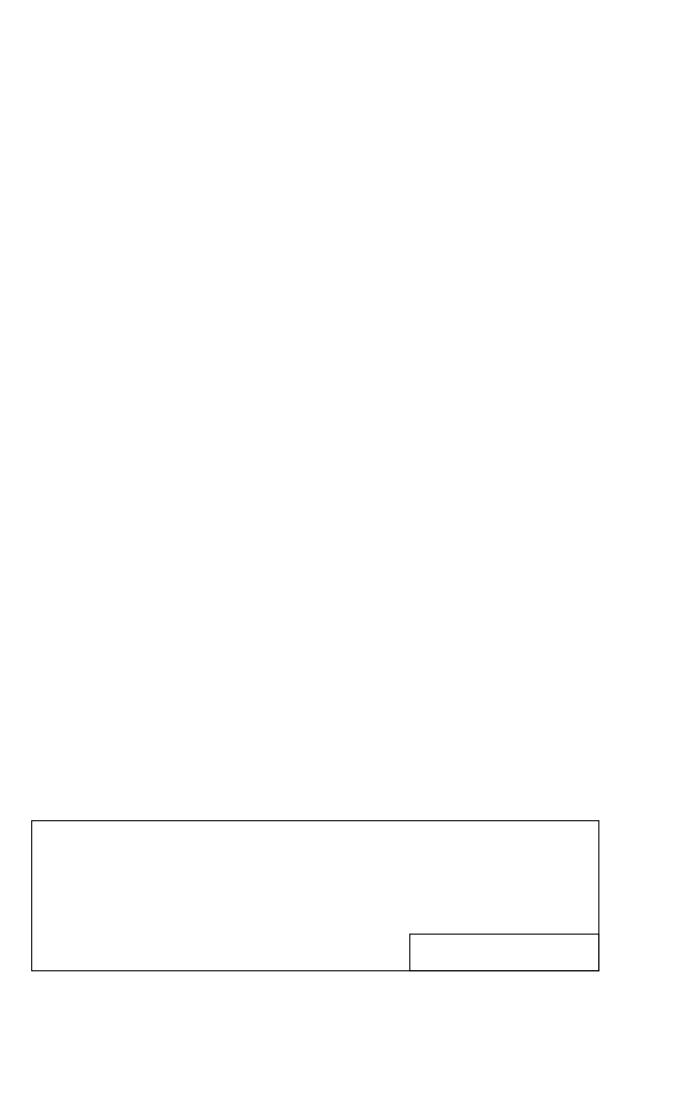
 $H\Y'WcfY'hYI hg'Zcf'h\Y'Wci fgY'UfY'5i ghfU']U'Dc`]h]Wg']b'h\Y'Hk Ybhm:]fgh7Ybhi fm'C`X'<math>\pm$ gh]hi h]cbgž BYk'7\U`Yb[Yg'YX"; Ybb'; YZZcfX'Yh'U`"ff Ua Vf]X[Y.'7 Ua Vf]X[Y'I b]j Yfg]hmDfYggž&\$% Łž'UbX'; cj Yfba Ybh'UbX'Dc`]h]Wg']b'5i ghfU']U'%\$h' YX"žYX"'5`Ub': YbbU'Yh'U`"fGmXbYm'DYUfgcb'5i ghfU']Už&\$% Ł"

FYWca a YbXYX FYgci fW/g

Hi hcf]U`g`dfYgi ddcgY`h\Uhmci `\Uj Y`fYUX`UbX`a UXY`Ub`\cbYghUhhYa dhhc`i bXYfghUbX`h\Y`fYei]fYX fgc fYUX]b[ZkfYUW\`k YY_žk \]W\`]g`ghZffYX[]b`l\hfgWci fgY`[i]Xd'c\fyY`ckX'' 7 Yb Zc Uh hU `UYUX]b[Zcf[

 $H\Y'WcfY'hYI hg'Zcf'h\Y'Wci fgY'UfY'5i ghfU`]U'Dc`]h]Wg']b'h\Y'Hk Ybhm:]fgh'7Ybh' fm'C`X' \pm bgh]hi h]cbgž BYk'7\U``Yb[Yg'$

Zcf' mf Y d c [' ž d c 'm 'U fY



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"'\lefi\Wb'hU_Y`a Ubm Zcfa gžZfca `XY`]VYfUhY`W\YUh]b['hc`UVW]XYbhU`mWcdm]b['Zfca `U`gci f\W' k]h\ci hUW_bck `YX[Ya Ybh'

IBGK [fcidgdu[]Uf]ga]bhch\YZc``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'

⇒ Uddfcdf]UhY 'dUfUd\fUg]b[...7\Ub[]b['U'ZYk 'k cfXg'UbX'd\fUgYg'k \]'Y 'a cghmfYhJ]b]b['h\Y'cf][]bU` ghfi 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 hWfYX]hUbX'hc d]YW]b['hc[Yh\Yf'ei chYg'UbX'dUfUd\fUgYg']bhc'U'bYk 'k \c`Yžk]h\ci hUddfcdf]UhY'fYZYfYbW]b["

7 c``i g]cb. 'k cf_]b['k]th 'cth Yfg'Vi hidUgg]b['cZZth 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_'thc'Ubcth Yf'ghi XYbh'VYZcfY'th Y'Xi Y'XUHYZcf'Zcf'th Y'di fdcgY'cZth Ya

- i bXYfgfUbX mci f'f][\hg'UbX'fYgdcbg]V]`]hJYg'Ug'U'gh XYbhUhl BGK
- VY`Uk UfY`cZd`U[]Uf]ga ž`Wcdmf][\hz'l BGK `Gh XYbh7cXY`cZ7cbXi WhUbX`5VWWdhUV`Y`l gY`cZ I BGK `=\forall H`F Ygci f\W\g`Dc`]\m\m
- VY 'Uk UfY 'cZh\Y 'ghUbXUfXg 'cZVY\Uj]ci f'Yl dYWYX 'cZYj YfmcbY ']b 'h\Y 'l BGK 'Wca a i b]hm
- `cWUHY 'gYfj]WYg'UbX ']bZcfa UH]cb'UVci hI BGK 'UbX'I BGK '@]VfUfm

Gca Y'cZh\YgY'UfYUg'k]``VY'ZJa]`]Uf'hc'mci žch\Yfg'k]``VY'bYk"'; U]b]b['U'gc`]X'i bXYfgHJbX]b['cZU``h\YfY`UhYX'UgdYWhg'cZ9@&9'k]``\Y`d'mci 'a U_Y'h\Y'a cghicZmci f'ghi X]Yg'UhI BGK "'\\hd.##qi V'YWfi |XYg"`]VfUfm'i bqk "YXi "Ui #\`]qY#JVci hY`]qY

5 WUXYa]W = DZcfa Uhjcb

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

fYei YghgʻZcfʻYl hYbg]cb/ `UhYʻgi Va]gg]cbgʻ[i]XY`]bYg/ fYj]Yk ʻcZa Uf_g/ I BGK ʻ< YUʻh\ 'UbXʻGUZYhmdc`]WJYg/