SOCW4011

9j]XYbWY`UbX`DfUWJWY`6UgYX`FYgYUfW

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

7ci fgY^{*}Cj Yfj]Yk

GHJZZ:7cbHJWh:8YHJ]`g

7cbj Ybcfg

B Ua Y	9a U]`	5j U]`UV]`] m	@cWUh]cb	D\cbY
5VbYf ⁻ Dccb		K YXbYgXUm%\$" \$'! %Ua ž'A cbXUm'&'! %da		- ' ,) \$*,)

@YWhi fYfg

BUa Y	9a U]`	5j U]`UV]`] m	(a)r V/V Ihlch	D\cbY
>UbY'Ack``	^a ck ``4 i bgk "YXi "Ui			-',)`\$*)\$

Hi hcfg

B Ua Y	9a U]`	5j U]`UV]`] m	@cWUhjcb	D\cbY
6Ub] [·] 5UXUa	V"UUXUa 4 i bgk "YXi "Ui			
DfUg\YY`U'? UfUb	d"_UfUb4 i bgk "YXi "Ui			

GWXcc`7cbHJWhi±bZcfa Uh]cb

GWXcc``cZGcWJU``GWJYbWYg

Fcca '%) -

A cfj Yb 6fck b 7 &\$

Ya U]`. 'gcgg4 i bgk "YXi "Ui

d\cbY. `\$&`-',) `% \$+

7ci fgY 8YHJ] g

7 fYX]h'Dc]bhg'*

Gi a a UfmcZh\Y'7ci fgY

7 ci fgY @YUfb]b[Ci hMca Yg

- $\%'' = XYbhJZmhNY']a dcfhUbWY'cZfYgYUfWN']b'gcWJU'k cf_'UbX'fc'Yg'cZgcWJU'k cf_Yfg']b'fYgYUfWN'$
- &" 7 f]h]WU``m'UggYgg fYgYUfWX a Ubi gWf]dhg
- " 5 ft]W `UhY fYgYUfW a Yh\cXg h\UhUfY Uddfcdf]UhY hc h\Y fYgYUfW ei Ygh]cbg
- ("8YacbglfUhY'g_]``g'hc'dYfZcfa'\Ug_g'fYei]fYX'Uhj Uf]ci g'g\U[Yg'cZfYgYUfW
-) " 91 d`U]b h\Y fY`Uncbg\]d VYkk YYb fYgYUfW. Yj]XYbW UbX dfUWnW

HYUWX]b[GlfUhY[]Yg

±0`UWWcfXUbWY`k]h\`I BGK `@YUfb]b[`UbX`HYUW\]b[`; i]XY`]bYgžh\]g`Wci fgY`U]a g`hc`Yb[U[Y`mci `]b`Ub UWhj Y``YUfb]b[`Ybj]fcba Ybh''H\]g`Wci fgY`j U`i Yg`WUgg`X]gW gg]cb`Ug`U`Wf]hJ\W```YUfb]b[`a Yh\cX`UbX`mci UfY`YI dYWhYX`hc`dUfh]\\]d\hY`UWhj Y`mXi f]b[``YWh fYg`UbX`hi hcf]U`g"'Hc``YUfb`UVci h`_YmWcb\Wdhgž]ggi Yg UbX`hY\\b]ei Yg`cZfYgYUf\\\žmci `UfY`YI dY\\YX\hc`\Wcbhf]\Vi hY`hc`ZY``ck `ghi XYbhg`VmVf]b[]b[`mci f`ck b YI dYf]Yb\\Yž\mfY`Uhb[`h\Ya `hc`gc\\]U``k cf_j U`i Yg`UbX`_bck `YX[YžUbX`Vmh\]b_]b[`\Wf]h]\\U``m'

@YWhi fYg

@YWi fYg`]bj c`j Y`dck Yf!dc]bhdfYgYbhUh]cbg`UXXfYgg]b['h\Y`Wci fgY`hYl hz`ch\Yf`gi dd`Ya YbhUfmfYUX]b[gž UbX`Yl Ua d`Yg`cZgcW]U``k cf_`fYgYUfW\"`Gh XYbhg`k]````YUfb`UVci h_YmWcbWYdhgž]ggi Ygž`UbX`hYW\b]ei Yg`cZfYgYUfW\"`±b`cfXYf`hc`a Ul]a]nY`h\Y`VYbYZ]hcZ`YWi fYgž'gh XYbhg`UfY`YbWci fU[YX`hc`Ug_'ei Ygh]cbg`UbX dUfn]W]dUhY`]b`[fci d`X]gW gg]cbg`Xi f]b[``YWi fYg"`

Hi hcf]U`q

Hi hcf]U`g`]bj c`j Y`ga U```UbX``Uf[Y`[fci d`X]gW gg]cbg`UbX`g_]``!Vi]`X]b[`UWf]j]h]Yg''; fci d`X]gW gg]cbg`UbX g_]``!Vi]`X]b[`YI YfW]gYg`UfY`XYg][bYX`hc`Yb\UbW'`i bXYfghUbX]b[`cZWUgg`a UhYf]U`g`UbX`hc`dfUWf]WY`g_]``g Wcj YfYX`]b``YWfi fYg`UbX`fYUX]b[`Ugg][ba Ybhg''`H\Y`[fci d`dfc`YWfiUgg][ba Ybh]g`U`gc`X]gW ggYX`Xi f]b[`h\Y hi hcf]U``gYgg]cbg''`#ig\ci `X`VY`bchYX`h\UhdUff]W]dUh]cb`]g`bchh\Y`gUa Y`Ug`UhYbXUbW''`H\Y`Wfi W]U``Y`Ya Ybh hc`[ccX`hi hcf]U`g`]g`\Uj]b[`U``a Ya VYfg`cZh\Y`WUgg`fYUX`h\Y`fYUX]b[g`UbX`UhYbXYX`h\Y``YWfi fYg''

AccX`Y

 $H\setminus [g:Wc:fgY:k]: i gY:A ccX:Y:hc:Ugg]gh:hY:UWX]b[:UbX::YUfb]b[:UWf]j]h]Yg"$

5ggYgga Ybh

Uh\hdg.##gcWJU`gWJYbVW`g"Ufhg"i bgk "YXi "Ui #gh XYbhg#fYgci fWrg#dc`]WJYg![i]XY`]bYg#"

5ggYgga Ybh'HUg_g

5ggYgga Ybh'hUg_	K Y][\h	8iY'8UhY	Gh XYbh@YUfb]b[Ci hWca Yg 5ggYggYX
@hYfUhifY`fYj]Yk`dfchcWc``	&\$I	Bch5dd`]WUV`Y	

 $ZYYXVUW_g (YY) = (1-1)^2 VY'U = ($

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

Ghi XYbhgʻUhhYbX]b[ʻK 96'hi hcf]U``WUggYgʻk]```\Uj YʻUʻX]ZYfYbhiUggYgga YbhihUg_"'±bZcfa Uhjcb'k]``'VYdfcj]XYX`]b`AccX`Y"

Hi fb]hb gYhb[. H\]g]g bchU Hi fb]hb Ugg][ba Ybh

5ggYgga Ybh' . 'Dfc YWnXYgWf]dh]cb 'UbX fYZYWh]cb fYdcfh

GhUfhXUhY. Bch5dd`]WUV`Y

@Yb[h\.'%)\$\$

8 YW] g.

Gh XYbhg k] ```k f]hY U fYdcfh XYgWf]V]b[h Y dfc YWh Ub X h Y]f fYZYWf]cb"

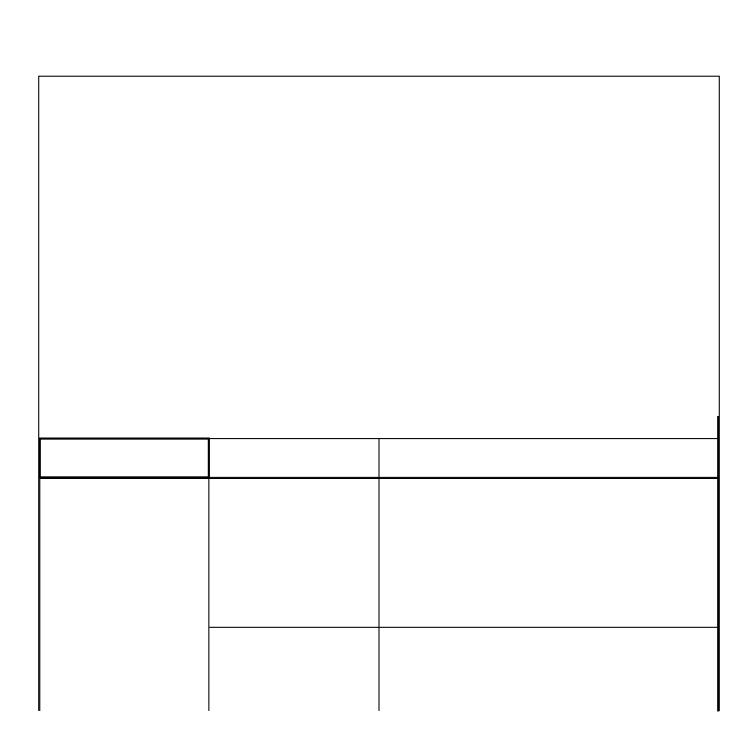
Gh XYbhg`k]``fYWY]j Y`k f]hhYb`ZYYXVUW_`UbX`U`bi a Yf]WU``[fUXY`k]h\]b`%\$`k cf_]b[`XUmg`cZgi Va]gg]cb"`H\Y ZYYXVUW_`g\YYh#i Vf]Wk]```VY`Uj U]`UV`Y`hc`gh XYbhg`Uhh\Y`ghUfhcZh\Y`Wci fgY`gc`h\Uhh\YmWUb`k cf_ hck UfXg`gdYW]Z]YX`ghUbXUfXg"`

.

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

Ghi XYbhgʻUhhYbX]b['K 96'hi hcf]U``WUggYgʻk]``\Uj YʻUʻX]ZYfYbhiUggYgga YbhihUg_"'±bZcfa Uhjcb'k]``VYdfcj]XYX`]b`AccXY"

 $\label{thm:continuous} \begin{tabular}{ll} His plant of the lighthfully a property of the ligh$



		Uffi]WY`k]``VY`igYX`Zcf`WUgg`X]gWigg]cb"`≢ik]`` VY`id`cUXYX`]b`AccX`Y"`
		Ga U```[fci d'X]gW gg]cb'cb'dfcYWf
		K YV WUggYg. Ghi XYbhg UfY YI dYWYX hoffYUX hk c Ufh]WYg VYZcfY UhrYbX]b['h\Y]f WUgg" H\Y Ufh]WYg k]` VY i gYX Zcf WUgg X]gW gg]cb" H\Ymk]``VY i d`cUXYX]b A ccX`Y"
K YY_^).^%) ^A UfVX^!^%- A UfVX	@YWhi fY	EiUbhhUhjYAYh\cXc`c[m
		I bXYfgtUbX]b['th\Y'ei Ubt]tUt]j Y'fYgYUfW\'dfcWfgg UbX'ZYUg]V]`]tmcZth\Y'YI dYf]a YbtU``a Yth\cX']b dfUWf]Wf'gYtt]b[g"'7cbXi Wf]b['UbX'Yj U`i Ut]b[YI dYf]a YbtU``ftgi W\'Ug'ei Ug]`UbX'F7HL'gti X]Yg']b dfUWf]Wf"'9l Ua d`Yg'cZdfUWf]Wf']bZcfa YX'fYgYUfW\"
	Hi kcf]U`	E i Ubhhuhj Y fygYufw fyj]Yk "
		: UWY! hc!ZUWY`WUggYg.`Ghi XYbhg`UfY`YI dYWYX`hc fYUX`Ub`Ufh]WY`VYZcfY`UhYbX]b[`h\Y]f`WUgg"`H\Y Ufh]WY`k]``VY`i gYX`Zcf`WUgg`X]gW`gg]cb"`#ik]`` VY`i d`cUXYX`]b`A ccX`Y"'
		Ga U```[fci d'X]gW gg]cb'cb'dfc^YWf
		K YV 'WUggYg. 'Ghi XYbhg'UfY'YI dYWhYX'hc'fYUX'hk c Ufh]WYg'VYZcfY'UhhYbX]b['h\Y]f'WUgg"'H\Y'Ufh]WYg'k]` VY'i gYX'Zcf'WUgg'X]gW gg]cb"'H\Ymk]``'VY'i d`cUXYX]b'AccX`Y"
K YY_'*.'&&'A UfVX'!'&* A UfVX	@YWh fY	Bc``YWnifY"'Bc'hihcf]U`"
K YY_'+.'&- 'A UfWX'!'& 5df]`	@YWn fY	A]I YX'A Yh\cXg'UbX'C i hWta Y'9j U'i Uh]cb'Zcf'GcW]U' K cf_'DfUWh]WY'-'\ck 'Xc'k Y'_bck ']ZUb']bhYfj Ybh]cb]g'YZYWh] Y3' <ck 'xc'k="" cf_yf'ubx'w]ybhg'<br="" y'uggygg'k="">dYfWYdh]cbg'cZ'k \Uh'k cf_g'ž'Zcf'k \ca ''UbX''i bXYf k \Uh'W]fW a ghUbWYg'3'9 Ua d'Yg'cZci hWta Y Yj U'i Uh]cb'gh X]Yg"</ck>
	Hi lcf]U`	: UWY!hc!ZUWY WUggYg. 'Ga U```[fci d'X]gW gg]cb'cb dfc^YWf'
		K YV 'WUggYg. 'Ghi XYbhg 'UfY 'YI dYWYX 'hc 'fYUX 'hk c Ufh]WYg 'VYZcfY 'UhhYbX]b['h\Y]f WUgg" 'H\Y 'Ufh]WYg 'k]` VY 'i gYX 'Zcf 'WUgg 'X]gW gg]cb" 'H\Ymk]``'VY 'i d`cUXYX]b 'A ccX`Y" '7 'Ugg 'X]gW gg]cb 'cb 'Ugg][ba Ybhg '& 'UbX ' "
K_YY_', .')	@YWhi fY	7 c``UVcfUhjj Y#dUfhjWjdUhcfmiUddfcUVXYg`hc`fYgYUfVX
		5 Wijcb fygyufw. 'Ubx Yh\bc[fUd\m' '9bgi f]b[dUfh]w]dUh]cb cZdfUWjh]cbYfg Ubx gYfj]WY i gYfg]g [Ybi]bY" '91 Ua d`Yg cZdfUWjWY]bZcfa YX fYgYUfwX

		dfc YVMg"
K_YY_''\&\'5df]`\!\%* 5df]`	@YWn fY	

FYgci fWyg

DfYgWf]VYX F Ygci fWYg

K YVVYfžA "'f&\$%) Ł"'3bb1k[Y D WeWSdJZ 7h[VW UW[EaU[S^I ad BdSUf[UW'I ? . 'DU'[fU] Y A UWa] ``Ub"

FYWca a YbXYX FYgci fW/g

7ci fgY 9j U'i Uh]cb UbX 8Yj Y'cda Ybh

Gi Va]gg]cb cZ5ggYgga YbhHUg_g

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

Image: Ybwei bhyfu'dfcv'ya k \yb'uhhya dhjb['hc'gi va]hmci f'Ugg][ba Ybhh\fci [\ 'Hi fb]h]bž'd'YUgY

Hy'Yd\cby'9| hy'fbu''Gi ddcfhcb'-',) '' ' ' %cf'Ya U]''h\Ya 'cb'Y! hy'fbu'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'''=Z'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'Y! hy'bg]cbž'Vi hmci
a i ghfYhJ]b'mci f'h]W_Yhbi a VYf'Zfca '9! hy'fbU''Gi ddcfhfU'cb['k]h\ 'Ubmch\Yf'fy'Yj UbhXcW a Ybhgt'hc
]bWi XY'Ug'Yj]XYbW' hc'gi ddcfhmci f'Y! hy'bg]cb'Udd']WUh]cb"'=Zmci 'Ya U]''9! hy'fbU''Gi ddcfhmci 'k]'`
Ui hca Uh]WJ'`mfYW']j Y'U'h]W_Yhbi a VYfZ'Vi h]Zmci 'hY'Yd\cbY'mci 'k]``bYYX'hc'gdYW]Z]WJ'`mUg_'Zcf'cbY''
Hi fb]h]b'U'gc'dfcj]XYg'i dXUhy'g'cb'h\Y]f'gmghYa 'ghUh' g'cb'Hk]hyf''

; YbYfU`mž'UggYgga YbhiHug_g'a i ghVY'gi Va]hhYX'Y`YVWfcb]\WJ``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'\\circ i fgY'g'A ccX`Y'g]hY'k]h\U`hYfbUh]j Y'gi Va]gg]cb'XYHJ]`g"

cfi]bZcfa Uhjcbicbi\ckihcigi Va]hUgg][ba Ybhgicbi]bYij]UiA ccXiY.i\hdg.#gh XYbhi bgk "YXi "Ui #\ck! gi Va]hUgg][ba Ybha ccXiY

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]XYbhJ``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.

 $7 \text{ cdm}b[...i g]b[...h\Y.gUa Y.cf.j Yfmig]a] \Uf'k cfXg'hc'h\Y.cf][]bU''hYl h'cf']XYU'k]h\ci h'U\V_bck `YX[]b[...h\Y.cf][]bU''hYl h'cf']XYU'k]h'cf']$

- 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 ž'ch\Yfg'k]``VY'bYk"'; U]b]b['U'gc`]X'i bXYfgHJbX]b['cZU``h\YfY`UhYX'UgdYWng'cZ9@+69'k]``\Y`d'mci 'a U_Y'h\Y'a cghicZmci f'ghi X]Yg'UhI BGK "'\\hd.##qi VYWfi |XYg"`]VfUfm'i bqk "YXi "Ui #\`]qY#JVci hY`]qY