

8Ua]Ub 'Ui g'FcghcW_. 'Jca '6Øf[Yf[Y`X ni f'5i gV]`Xi b[''9]b'BYi UbZUb['

8 Ua]Ubž'&* ž'_Àa dZh'U`g'hfUbg'A Ubb'i a '5fVY]h"'B UWX F ØW_gWX`À[Yb'\Uh'Yf'bi b'Y]bY'5i gV]`Xi b[gghY``Y']a 'JYf_Ui Z [YZi bXYb"



 $FcghcW_{\check{z}'8Yi} hgWX `UbX'!' = b'8Yi hgWX `UbX'' YffgWX h'Y]b'U_i hYf : UWX_fAZhYa Ub[Y'\check{z}'k A\fYbX'j]Y'Y'' b[Y'A YbgWX Yb'i a 'Y]bYb 9]bgh]Y[']bg'6Yfi Zg`YVYb'_Aa dZYb'''8Ua]UbžY]b'&*!'A\f][Yf'A Ubb Ui g'FcghcW_{\check{z}'}XYf'Xi fWX'X]Y'8c_i '<Ufhn'i bX'\Yfn`]WX 'VY_Ubbh k i fXYž']gh'Y]b'6Y]gd]Y`'ZØf'X]YgY'FYU`]hAh'''GY]h'XfY]'*\J\fYb']gh 8Ua]Ub'c\bY'5fVY]hii bX'\Uhij]Y'Y'FØW_gWX`A[Y'Yf`YVh'''5`g hfUbg[YgWX'YWXh']WXYf'A YbgWX'g]Y\h'Yf'g]WX'ni gAhn`]WXYb'<ØfXYb Ui Z'XYa '5fVY]hga Uf_h'Ui g[YgYhnh'''BUWX'nU\`fY]WXYb 6Yk YfVi b[Yb'\Uh'Yf'bi b'X]Y'7\UbWY'Ui Z'Y]bY'5i gV]'Xi b['ni a JYf_Ai ZYf'i bX'k]fX'VU`X']b'Y]bYa '8]gWci bhYf'UfVY]hYb''$

: Øf'8 Ua]Ub'VYXYi hYh'X]YgY'; Y`Y[Yb\Y]h'Y]bYb'GWXf]hh'ni fØ $W_$ ']b Y]b'[YfY[Y`hYg'@YVYb'i bX'a Y\f'GhUV]`]hÀh"'9f'\Uh'j cf'_i fnYa 'j cb

<Ubbcj Yf'bUWX 'FcghcW_'ni f@W_[Ync[Yb'i bX'k c\bh'bi b'VY]
gY]bYf': fYi bX]b'? Uh\Uf]bU"'GY]bY'A i hhYf']gh'YVYbZU``g'ghc`n'Ui Z
X]Y': cfhgWXf]hhY']\fYg'Gc\bYg"'8Ua]Ub'VYhcbhž'XUgg'Yf'b]WXh'a Y\f
dYfgdY_h]j `cg']gh'i bX'U_h]j 'ni f'5fVY]h'[Y\hž'k Ug']\a 'gWXcb
HfÀbYb'XYf'9f`Y]WXhYfi b['Ybh`cW_h\\Uh"</pre>

< YfUi gZcfXYfi b[Yb ZØf [YgWX YWX hYfX]j YfgY A YbgWXYb</pre>

8 Ua]Ubg'; YgWk]Wk hY'j YfXYi h']Wk hž'k]Y'ghfi _hi fY'`Y
8]g_f]a]b]Yfi b['U``Y'[YgY``gWk UZh`]Wk Yb' 6YfY]Wk Y'dfÀ[Yb'_Ubb''
9]bY'Ghi X]Y'j cb'8 f'''HUa ½g' i 'Yg': Øhhmi bX'? c``Y[Ybž']a '5i ZhfU[
XYf'5bh]X]g_f]a]b]Yfi b[gghY``Y'XYg'6i bXYgž'nY][h'Ui Zž'XUgg'Yg']b
8 Yi hgWk `UbX'Yf\YV']Wk Y'8 YZ]n]hY']b'XYf'5bYf_Ybbi b['i bX
5 bh]X]g_f]a]b]Yfi b['[YgWk `YWk h']Wk Yf'J]Y'ZU'h']b'XYf
6 YgWk ÀZh][i b['[]Vh''8]Y': cfgWk Yf']XYbh]Z]n]YfhYb'gYWk g'nYbhfU'Y
< UbX'i b[gZY`XYfž'i a 'X]Y'+b_`i g]cb'j cb']bhYfl ž'hfUbgl'i bX
UbXYfYb'UV]bÀfYb'A YbgWk Yb'ni 'ZÒfXYfb.'6Yhf]YVg_i `hi fž
DYfgcbU`[Yk]bbi b[ž'I a [Ub['a]h'[YgWk `YWk hgVYnc[YbYb'8 UhYbž
GdfUWk Y'i bX'?ca a i b]_Uh]cb'gck]Y'GUb]hÀfUb`U[Yb'i bX
6 Yfi Zg_`Y]Xi b["

8]Y '9f[YVb]ggY 'XYf 'Ghi X]Y 'i bhYfghfY]W Yb 'X]Y 'B chk YbX][_Y]hž 6YbUW hY]'][i b[Yb 'Xi fW 'nk Y][YgW 'YW h']W Y B cfa]Yfi b[Yb 'ni ØVYfk]bXYbž X]Y 'U 'Y D\UgYb 'XYg '5fVY]hg YVYbg 'VYhfY ZZYb" 5fVY]h[YVYf 'g]bX 'fYW h']W 'j YfdZ]W hYhž 5bh]X]g_f]a]b]Yfi b[ga U» bU\a Yb 'ZØf [YgW 'YW hYfX]j YfgY 6YgW ÀZh][hY 'i a ni gYhnYb" 8]Y '9a dZY\ 'i b[Yb 'n]Y 'Yb 'XUfUi Z'UVž 8]g_f]a]b]Yfi b['UVni VUi Yb ii bX 'dfÀj Ybh]j Y 'A U» bU\a Yb 'ni f I bhYfghØhni b['[YgW 'YW hYfX]j YfgYf 'A YbgW Yb 'ni 'Yf[fY]ZYb" '8]Yg]gh'VYgcbXYfg'fY 'Yj Ubhž'XU 'hfUbggYl i Y 'Y 'A YbgW Yb 'Ni [Ub['ni a YfghYb'5fVY]hga Uf_h`\UVYb"

I b[`Y]WX\Y]hYb Ui Z XYa 5fVY]hga Uf_h

8Yf'5fVY]hga Uf_h']b'8Yi hgW\`UbX'nY][h']bg[YgUa h'i b[`Y]W\Y

8 Ug·5``[Ya Y]bY'; `Y]W\VY\UbX`i b[g[YgYhn·fb;; Ł·gc``
8]g_f]a]b]Yfi b[Yb·j Yf\]bXYfbž'XcW\'XYf'BUW\k Y]g'j cb
8]g_f]a]b]Yfi b[']gh·gW\k]Yf]['''JYfgW\]YXYbY'9f_`Àfi b[Yb·ZØf
8]g_f]a]b]Yfi b[žk]Y'X]g_f]a]b]Yfi b[gbY][YbXY'Jcfi fhY]`Y'i bX
bcfa Uh]j Y·9fk Ufhi b[Ybž'a UW\Yb'Yg'\YfUi gZcfXYfbXž
I b[`Y]W\VY\UbX`i b[Yb·ni 'VYgY]h][Yb''8]Y'5i gk]f_i b[Yb·j cb
8]g_f]a]b]Yfi b['[Y\Yb'ØVYf']bX]j]Xi Y``Y'6YbUW\hY]`][i b[Yb
\]bUi g'i bX'VYhfYZZYb'Ui W\'X]Y'k]fhgW\UZh`]W\Y'@Y]ghi b[gZÀ\][_Y]h
i bX'X]Y'Ni Zf]YXYb\Y]h'Ua '5fVY]hgd`Uhn''

I a 'X]YgYb'< YfUi gZcfXYfi b[Yb'ni 'VY[Y[bYbž'ZcfXYfh'X]Y; YgY``gW\UZh'Y]bY'J YfVYggYfi b['XYf'7\UbW'b['Y]W\\Y]h'Ui Z'XYa 5fVY]hga Uf_h" A U» bU\a Yb'k]Y'5bh]X]g_f]a]b]Yfi b[ghfU]b]b[g gck]Y'X]Y'I bhYfghØhni b['VYbUW\hY]`][hYf'; fi ddYb'Xi fW\ Ei chYbfY[Y`i b[Yb'g]bX'i bj Yfn]W\hVUf"'Ni XYa ']gh'Y]bY ZfØ\nY]h][Y'I bhYfghØhni b[']a '6]`Xi b[ggmghYa 'YfZcfXYf`]W\ž'i a 8]g_f]a]b]Yfi b['j cb'5bZUb['Ub'ni 'j Yfa Y]XYb"

 $8]Y' < YfUi gZcfXYfi b[Ybž'j cf'XYbYb'8Ua]Ub'i bX'j]Y`Y'UbXYfY ghY\Ybž'g]bX'b]WAh'bi f'dYfgÒb`]WAY'GWA]W_gU`Yž'gcbXYfb'gd]Y[Y`bY]b'[YgUa h[YgY``gWAUZh`]WAYg'DfcV`Ya 'k]XYfž'XUg'Xf]b[YbXUb[Y[Ub[Yb'kYfXYb'aigg"'8]Y'j ca '6i bXYga]b]ghYf]i a 'ZØf 5fVY]h'i bX'Gcn]U`Yg'i bX'UbXYfYb'<math>\Rightarrow$ gh]hi h]cbYb'[YZcfXYfhYbFYZcfa Yb'g]bX'Y]b'GWAf]hh']b'X]Y'f]WAh][Y'F]WAhi b[ž'i a 7\UbWb[`Y]WA\Y]h'ZØf'U``Y'A YbgWAYbž'i bUV\Àb[]['j cb; YgWA`YWAhž'<Yf_i bZh'cXYf' \Rightarrow XYbh]hÀhž'ni 'gWAUZYb''

 $: \emptyset f `k Y] h Y f Y ` \pm Z c f a U h] c b Y b ``Y g Y b `G] Y `X] Y `6 Y f] W h `\emptyset V Y f `8 U a] U b g \\ : Y g W X] W h Y ž `X] Y `G h i X] Y `n i f `; Y g W `Y W h Y f X] j Y f g] h A h `g c k] Y `X] Y `$

 $\frac{5\,b\,U\,mg\,Y\,ni\,\,'l\,\,b\,[\,\,`Y\,]W\,\,\backslash\,Y\,]h\,Y\,b\,'i\,\,b\,X\,'\,8\,]g_f]a\,\,]b\,]\,Y\,fi\,\,b\,[\,\,`Ui\,\,Z\,'X\,Y\,a\,\,5\,f\,V\,Y\,]hga\,\,U\,f_h''$

8 Y hU]`g	
J c f ZU``	Gcbgh][Yg
Cfh	FcghcW_ž'8YihgWX`UbX
EiY``Yb	• k k k "XYfk YghYb"XY
	k k k "Ubh]X]g_f]a]b]Yfi b[gghY``Y"
	XY
	• k k k "VdV"XY

6Ygi WXYb G]Y i bg Ui Z. b!U["bYh