## GhUb`Ym'7i d'8fUa U. DUbh\Yfg'9X[Y C]`Yfg']b'8ci V`Y'CH'G\ck Xck b°

H\Y'GhUb`Ym'7i d': ]bU``]g'h]YX'%!%'Ug'h\Y'DUbh\Yfg'UbX'C]`Yfg \YUX'hc'; Ua Y'' ']b'Gi bf]gYž': `cf]XUž'cb'\$\dag{b} bY'+ž'&\$&) "



Gi bf]gYž: `cf]XUžI G5 ! 5g'h\Y'gi b'gYhg'cb'Gi bf]gYž: `cf]XUž
Ubh]W]dUh]cb'Z]``g'h\Y'U]f'Zcf'; Ua Y'' 'cZ'h\Y'GhUb`Ym'7i d': ]bU`ž
\UddYb]b['h\]g'A cbXUm'Uh', 'd"a "'9H"'H\Y'gYf]Yg']g'W'ffYbh`m'h]YX
%!%'UZhYf'Ub'Y`YWhf]Zm]b['; Ua Y'&'h\Uh'gUk 'h\Y': `cf]XU'DUbh\Yfg
ghYU`'U'Xci V`Y!cj Yfh]a Y'j ]Whcfm'cj Yf'h\Y'9Xa cbhcb'C]`Yfg'Vm'U
gWcfY'cZ')!(ž'h\Ub\_g'hc'6fUX'A UfW\UbX g'[ Ua Y!k ]bb]b['VUW\_\UbX
[ cU`"

; Ua Y'&'k Ug'bch'1 gh'Ubch\Yf'W\UdhYf']b'h\Y'd`UmcZZg/']h'k Ug'U fc``YfWcUghYf'cZ'Ya ch]cbg'Zcf'Vch\'hYUa g"'H\Y'Z]fgh'dYf]cX Vfci [\h'U'Zi ffm'cZ'UWh]cbž'k ]h\'h\Y'C]`Yfg'fUW]b['hc'U''!&'`YUX" 7cbbcf'A W8Uj ]X'g\ck WUgYX'\]g'd`Uma U\_]b['g\_]``gž'Ugg]gh]b['@Ycb8fU]gU]h`cb'U'[cU`'h\Uh'a Uf\_YX'8fU]gU]h` g'%\$h\'cZ'h\Y'd`UmcZZg"

<ck Yj Yfž'h\Y'DUbh\Yfg'fYZ gYX'hc'VUW\_'Xck bž'WUd]hU`]n]b['cb
dck Yf'd`Umg'UbX'gY]n]b['cddcfhi b]h]Yg'k \Yb'h\Ym'UfcgY"
A UfWXUbXž']b'dUfh]W'`Ufž'ghc`Y'h\Y'g\ck 'Vm'gWcf]b['bch'cb`m'h\Y
[ Ua Y!k ]bbYf'Vi h'U`gc'U'd]j chU`'g\cfh!\UbXYX'VfYU\_Uk Um'[ cU`
h\Uh'h]ddYX'h\Y'gWU`Yg']b': `cf]XU g'ZUj cf"</pre>

## $HY ; cU^hYbX]b[6Uhh^Y$

±b 'h\]g`\][\!ghU\_Yg`Xi Y`ž`[cU`hYbXYfg`GYf[Y]`6cVfcj g\_m`UbX Ghi Ufh`G\_]bbYf`YI\]V]hYX`k\m`h\YmfY`]bhY[fU``hc`h\Y]f`hYUa g d`UmcZZfi bg"`6cVfcj g\_m`a UXY`U`ghU[[Yf]b[`, (`gUj Yg`cb`-& g\chgž`VcUgh]b[`U`"-%'`gUj Y`dYfW\bhU[Y"`A cgh`bchUV`mž`\Y`WUa Y i d`\i [Y`Vm`ghcdd]b[`?UgdYf]`?UdUbYb`Xi f]b[`U`Wf]h]WU``&!cb!% g]hi Uh]cb`g\cfh`m`VYZcfY`h\Y`XYW]g]j Y`a ca Ybhg`cZ'h\Y`[Ua Y"`<]g fYW\bh`dYfZcfa UbW\g`\Uj Y`[UfbYfYX`UXa]fUh]cb`Zfca hYUa a UhYgž`k]h\`Zcfk UfX`9j Ub`FcXf][i Yg`Wca a YbX]b[`\]a `Zcf\]g`\_Ym`gUj Yg`UbX`XYZYbgYa Ub`BUhY`GW\a]Xh`YI dfYgg]b[[fUh]hi XY`Zcf`\]g`Wcbhf]Vi h]cbg"

 $Cb'h Y'ch Yf'Yb X'cZ'h Y']W Z'G_]bbYf'U gc'ZUW X' \] g'g \ UfY'cZ \\ W U Y b[Yg'' K]h ** "gUj Yg'cb' + ( 'g \ chgz' \ Y' \ UX'Ub''', - & "gUj Y d YfW bhU[Y'Ub X'U'`ck YX'U'Wci d Y'cZ'hci [\ '[cU`gz']bWi X]b['U XYZYWhY X'g \ ch'Vm'8a]hfm'?i `]_cj '''C] Yfg'WcUW '?f]g'?bcV`Ui W bchY X'G_]bbYf g'ghfcb['dYfZcfa UbW XYgd]hY'h \ Y'hci [\ '`cggz Ya d \ Ug]n]b['h \ Y'bYY X'Zcf' \]a 'hc'a U]bhU]b'h \]g'Yj Y`'cZ YI WY``YbW 'Ug'h \ Y'gYf]Yg'dfc[fYggYg''$ 

## K \ Uh'@]Yg'5\YUX

5g'Vch\ 'hYUa g'\YUX']bhc'; Ua Y'' ž'Wfi W]U`'ei Ygh]cbg'`]b[Yf"'7Ub h\Y'C]`Yfg']a dfcj Y'h\Y]f'YUf`m![Ua Y'Wcbg]ghYbWm'UZhYf'U``ck]b[h\fYY'[cU`g'cb'h\Y'Z]fgh'hYb'g\chg']b'; Ua Y'&3'K]``h\Y'DUbh\Yfg VY'UV`Y'hc'a U]bhU]b'h\Y]f'U[[fYgg]j Y'a ca Ybhi a ž'dUfh]W'`Uf`m']bh\Y'h\]fX'dYf]cX'k\YfY'h\Ym'dfYj]ci g`m'ghfi [[`YX3'K]h\'Vch\hYUa g'YmY]b['h\Y'df]nYž'h\Y'ghfUhY[]Yg'h\Ym'Ya d`cm'Uh'5a YfUbh 6Ub\_'5fYbU'Wci `X'\YUj]`m']bZi YbW''h\Y'hfUYWhcfm'cZ'h\]g'gYf]Yg"

 $\label{lem:ham} H\Y\ghU\_Yg\Wci\Xb\h\VY\\][\Yf"\H\Y\DUbh\Yfg\\Uj\Y\U\bchYk\cfh\m$ 

hYb'd`UmYfg']b'XciV`Y'X][]hg'Zcf'dc]bhg'h\]g'dcghgYUgcbž``YX'VmGUa'6YbbYhhž'k\c']g'W'ffYbh`m'g]hh]b['Uh'%, 'dc]bhg"'AYUbk\]`Yžh\Y'C]`Yfg'\UjY'Zcif'cZ'h\Y'hcd'Z]jY'gWcfYfgž'k]h\'AW8Uj]X'`YUX]b[h\Y'dUW\_'k]h\'&, 'dc]bhg"'H\Y'WUg\'VYhkYYb'h\YgY'hkc'hU`YbhYXfcghYfg'dfca]gYg'hc'dfcXiWY'd`Ybhm'cZ'Z]Yfm'WcadYh]h]cb'Ug'h\YmVUhh`Y'Zcf'U'WXUbWY'Uh'h\Y'WcjYhYX'GhUb`Ym'7id"

K ]h\'; Ua Y'' '' gh'Ufci bX'h\Y'WcfbYfž'ZUbg'Zfca 'Vch\'g]XYg'k]``VY
YU[Yf`m'Uk U]h]b['hc'gYY'k\]W\'hYUa 'k]``'hU\_Y'h\Y'YX[Y"'5g
\]ghcfm'hY``g'i gž'h\YfY g'gca Yh\]b['hc'VY'gU]X'Zcf'\ca Y!]WY
UXj UbhU[Yž'UbX'h\Y'DUbh\Yfg'k]``'VY'Wci bh]b['cb'h\Y]f'ZUbg'hc
fU``m'VY\]bX'h\Ya ']b'k\Uh'dfca ]gYg'hc'VY'Ubch\Yf'i bZcf[YhhUV`Yb][\h'cZ'\cW\_Ym"

cfacfYXYhU]`gž'WXYW\_cihB<@"WcažIG5'HcXUmž'UbX'9GDB"

8 Y hU]`g	
Cfh	Gi bf]gYž': `cf]XUž'I G5
EiY``Yb	• k k k "b\`"Wca
	• k k k "i gUhc X Um"Wca
	• k k k "Ygdb"Wca

6 Ygi W Yb 'G]Y 'i bg 'Ui Z 'a Y]b!k ]Yb "b Yh