## : `cf]XU/ $_{\circ}$ \$' - /g': cchVU```GhUfg'G\]bY. Hcd $_{\circ}$ &\* `FYWfi ]hg'7ca a ]h'H\]g'Gi a a Yf $_{\circ}$

91 d`cfY; UXgXYb'7ci bhm/, \$'-/g']a dUWhicbih\Yi\][\gW\cc``ZcchVU```fYWfi]h]b['gW\bYž'k]h\'bchUV`Y'Wca a]ha Ybhg UbXihcdidfcgdYWhg'Zcf'&\$&\*"

; UXgXYb'7ci bhmži G5'!'5g'gi a a Yf'\YUhg'i džgc'XcYg'h\Y
YI WhYa Ybh'cZ'\][\'gW\cc``ZcchVU```fYWfi]h]b['UWfcgg': `cf]XU"'K]h\
d`UmYfg'a U\_]b['Wc``Y[Y'Wca a]ha Ybhgž']h g'Ub'YI\]`UfUh]b['h]a Y
Zcf'Uh\`YhYgž'WcUW\Ygž'UbX'ZUbg'U`]\_Y"'5WWcfX]b['hc'
; U]bYgj]``Y"Wca ž'bchUV`Y'Wca a]ha Ybhg'fYWYbh`m'Ubbci bWYX
]bWi XY'\dangle gh]WY': ]hndUhf]W\_'Zfca 'Gh"'H\ca Ug'5ei]bUgž'fUb\_YX'Bc"
%('cj YfU``'UbX'h\Y'Bc"'&'gUZYhmž'k\c'\Ug'Wca a]hhYX'hc'h\Y
I b]j Yfg]hm'cZ'; Ycf[]U"'A YUbk\]`Yž'?U]XYb'<U``'Zfca 'A]`hcbž
fYWc[b]nYX'Ug'h\Y'Bc"'%'Uh\`YhY'UbX'Bc"'&' 'cj YfU``ž'\Ug'W\cgYb
hc'fYdfYgYbh'h\Y'I b]j Yfg]hm'cZ': `cf]XU"

## HfUW]b[ h\Y 6Ygh

 $\label{thm:wasses} We a d]`YX`Vm`fYWfi ]h]b[`YI dYfhg` & b`GUbhi WW]`UbX`B]W_`K ]`gcb" \\ H\]g`mYUfž` & ; `5WUXYa m``YUXg`h\Y`dUW_`k ]h\`U`k \cdd]b[`hYb d`UmYfg`a U_]b[`h\Y`W' h": `cf]XU`GhUhY`I b]j Yfg]hm`VcUghg`h\Y`a cgh Wca a ]ha Ybhg`Zfca `h\]g`Y`]hY`[fci dž`gYW' f]b[`Y][\h'd`UmYfgž`k \]`Y A ]Ua ]`Zc``ck g`WcgY`m`k ]h\`Z]j Yž`h\fYY`cZ`k \ca `UfY`]b`h\Y`hcd`&$" \\ H\]g`[fck]b[`fYdfYgYbhUh]cb`Zfca `A ]Ua ]!8UXY`UbX`6fck UfX Wci bh]Yg`a Uf_g`U`dfca ]g]b[`g\]Zh`Zfca `dfYj ]ci g`mYUfg"$ 

5a cb['h\Y'ghUbXci h'bUa Yg']g'8YffY\_'7ccdYf'U[U]bž
i bXYfgWcf]b['\]g'dfck Ygg'UbX'dcdi `Uf]hm'Ug'U'fi bb]b['VUW\_"'H\Y
`]gh'\]bhg'Uh'Ya Yf[]b['hU`Ybh'UWfcgg'U'a i `h]hi XY'cZ'dcg]h]cbg'
Zfca 'h][\h'YbXg'hc'XYZYbg]j Y'd`UmYfg' 'fYZ'YWh]b['h\Y'XYdh\'cZ
hU`Ybh'bi fhi fYX']b': `cf]XU"

## : `cf]XU'; Uhcfg 'FYWfi ]ha Ybh'; U]b]b[ HfUWh]cb

5a cb['h\Y'; Uhcfg ``UhYgh'UXX]h]cbg'UfY'ei UfhYfVUW\_'K ]``; f]ZZ]bž fUb\_YX'Bc"'() 'UbX'h\Y'Zci fh\!VYgh'E 6'cj YfU``ž'UbX'cZZYbg]j Y `]bYa Ub'; b]j fY'7Uffž'k \c g'fUb\_YX'Bc"'+&"'H\Y'Wcbh]bi YX UWei ]g]h]cb'cZ'hU`Ybh'fYZYWhg'h\Y'dfc[fUa g'Ua V]h]cbg'Zcf'U fcVi gh'fYWfi ]h]b['WUgg'Vm'h\Y'YbX'cZ'h\Y'mYUf"'Bch'hc'Zcf[Yhž igh]b'K]``]Ua gž'U'fi bb]b['VUW\_'Zfca'; U]bYgj]``Yž'\Ug'U`gc Wca a ]hhYX'hc'h\Y'; Uhcfgž'k\]WX'UXXg'U'`cWU`'ZUj cf'hc'h\Y]f [fck]b['fcghYf"

- ?Ym; Uhcfg;FYWfi]hg.
  - K ]``; f]ZZ]b fB c"'() E 6Ł
  - $\circ$  ; b]j fY '7 Uff 'fB c" + &  $\neq$  @Ł
  - ?U]XYb'<U``fBc"'&' '5H<Ł
  - $\circ$   $\Rightarrow$  gh]b 'K ]``]Ua g 'fB c " ( 'F 6Ł

- 7\UbWY``cf'7Ua dVY```fBc"'+\$'CHŁ
- ?Y\_i U'5i a i U'fBc"'-\$'H9Ł

5g'h\Y'gi a a Yf'dfc[fYggYgžYmYg'k]``'VY'dYY`YX'cb'a Ubm'd`UmYfgžbchUV`m'\text{J\_Y'?fYi`'UbX'7U'j]b'FiggY``ž'Vch\'cZ'k\ca''UfY'VY]b[\YUj]`m'WcifhYX'Vm': `cf]XU'Ua cb['ch\Yfg"'K]h\'?fYi`'fY[UfXYX'Ugh\Y'hcd'YX[Y!fig\Yf'UbX'FiggY``'Ug'h\Y'VYgh'k]XY'fYWY]jYf']b'h\YghUhYž'h\Y]f'dchYbh]U``Wca a]ha Ybhg'Wci`X'Zifh\Yf'Y`YjUhY:`cf]XU g'fYWfi]ha Ybh'`UbXgWUdY"

#D'U'bi hg\Y``ž'h\Y'gi a a Yf'cZ'&\$&) ']g'g\Ud]b['i d'hc'VY'Ub YI\]`UfUh]b['W\UdhYf']b': `cf]XU'\][\'gW\cc``ZcchVU```fYWfi]h]b[žk]h\'Ub'UffUm'cZ'mci b['hU`Ybhg'gYh'hc'a U\_Y'h\Y]f'a Uf\_'Uh i b]j Yfg]h]Yg'UWfcgg'h\Y'bUh]cb"'H\Y'`cWU`'Z'Uj cf'UbX'Z]YfWV Wca dYh]h]cb'Ybgi fY'h\YfY g'U`k Umg'gca Yh\]b['YI W]h]b['cb'h\Y\cf]ncb' 'UbX'ZUbg'WUb'VY'gi fY'h\Y'VYgh']g'mYh'hc'Wca Y°

| 8YhU]`g |                               |
|---------|-------------------------------|
| Cfh     | ; UXgXYbʻ7cibhmžilG5          |
| EiY``Yb | • k k k "[ U]b Y gj ]``Y "Wca |
|         | • kkk"igUhcXUm"Wca            |
|         | • gdcfhg"mU\cc"Wca            |

6Ygi WXYb G]Y i bg Ui Z. a Y]b!k ]Yb bYh