

## 8 UddYf @UVg \_ccdYf]Yfh a ]h 7 \ U]bU`mg]gž i a B: H!VUg]YfhY; Y`Xk ÀgWXY Y]bni XÀa a Yb

8UddYf@UVgžY]bYgXYfYfZc`[fY]WXghYbIbhYfbY\aYb]a B:  $H!6YfY]WX z' \setminus Uh'g]WX a ]h'7 \setminus U]bU'mg]gz'Y]bYa '6'cW_WX U]b!$ ±bhY``][YbWY!IbhYfbY\aYbžniqUaaYb[YhUbžia 'qY]b 7ca d`]UbWY!DfcZ]`]a B: H!; YgWAZhini j YfVYggYfb"8Ug  $I bhYfbY\a Yb'k ]fX'X]Y'9f_Ybbhb]gqY'j cb'7\U]bU`mq]q$ jYfkYbXYbžia 'YXY'XYf'HfUbgU\_h]cbYbž'X]Y'6Ybi hnYf'a ]h ]\fYb DfcXi hYb Xi fW\ZO\fYbži bX XYb Nk YW 'YXYf HfUbqU h]cb VYqqYf ni 'j YfqhY\Yb"'8 ]Yq'k ]fX ']\bYb '\Y`ZYbž ; Y`Xk ÀgWXYZÀ``Y'i bX'A Uf\_ha Ub]di `Uh]cbgj Yfgi WXY'ni Yf\_YbbYb" 8UddYf @UVg bi hnh X]Y @Ogi b[Yb j cb 7\U]bU`mg]qži a 'X]Y '5i Zq]W\h'ni 'j YfVYqqYfb '8 UddYf'@UVqž  $X]YGWXOdZYfVYaYf_YbgkYfhYfDfcY_hYk]Y7fmdhc_]hh]Yg$ i b X B 65 Hcd G \ c hqž \ Uh d Ufhb Y fq W \ UZh ] W a ] h I bhYfbY\a Ybžia 'X]Y', VYfk UWXi b['jcb'HfUbgU\_h]cbYb'a ]h gY]bYb DfcXi \_hYb ni 'j YfVYggYfb" 8 Ug'/ Ua d\Y``]d/

8 UddYf @UVgžY]bYg XYf YfZc`[ fY]WX ghYb I bhYfbY\a Yb ]a
B: H!6YfY]WX ž\Uh g]WX a ]h 7\U]bU`mg]gžY]bYa 6`c W\_WX U]b!
=bhY``][ YbWY!I bhYfbY\a Ybžni gUa a Yb[ YhUbži a gY]b
7ca d`]UbWY!DfcZ]``]a B: H!; YgWX ÀZh'ni j YfVYggYfb" 8 Ug
I bhYfbY\a Yb k ]fX X]Y 9f\_Ybbhb]ggY j cb 7\U]bU`mg]g
j Yfk YbXYbži a 'YXY XYf HfUbgU\_h]cbYbžX]Y 6Ybi hnYf a ]h
]\fYb DfcXi \_hYb Xi fWX ZØ\fYbži bX XYb Nk YW\_'YXYf
HfUbgU\_h]cb VYggYf ni j YfghY\Yb" 8 ]Yg k ]fX']\bYb \Y`ZYbž
; Y`Xk AgWXYZA``Yi bX A Uf\_ha Ub]di `Uh]cbgj Yfgi WXY ni
Yf\_YbbYb"

## 8 UddYf'@UVg'bi hnh'X]Y'@Ògi b[Yb'jcb 7\U]bU`mg]gž'i a 'X]Y'5i Zg]W\h'ni 'j YfVYggYfb

8 UddYf @UVgž X]Y GW. OdZYf VYa Yf\_Ybgk YfhYf Dfc Y\_hY k ]Y
7 fmd hc\_]hh]Yg i b X B 65 Hcd G\chgž\Uh d Ufhb YfgW. UZh`]W. a ]h
? YhhYb Ub U`mgY ž Y]b Yg XYf ZØ\fYb XYb 6`c W\_W. U]b! & hY``][ Yb WY!
I bhYfb Y\a Yb ž i a 'X]Y , VYfk UW. i b[ 'j cb 'HfUbgU\_h]cb Yb a ]h
gY]b Yb 'Dfc Xi \_hYb 'ni 'j YfV YggYfb" '8 Ug I bhYfb Y\a Yb 'a OWXhY
VYggYf j YfghY\Yb ž k Ug X]Y 6 Yb i hnYf a ]h gY]b Yb '? fY Uh]cb Yb
a UW. Yb i b X c V 'X]YgY 'hUhg A W.`]W. 'j cb 'V OgYb '5 \_hY i fYb 'ZØf']``Y[ U`Y
Nk Y W\_Y '[ Yb i hnh k Yf X Yb"

B: Hg'\UVYb'Y]bYb'gW\YWhYb'FiZ'VY\_ca a Ybž'XU'Y]b][Y A]h[`]YXYf'XYf'?fmdhck À\fi b[g!7ca a i b]hm'VY\Ui dhYbž'XUgg'g]Y Ui Z[fi bX'XYf'i bj YfgW\Aa hYb'DfY]gY'Y]b][Yf'X]YgYf'B: Hg'ni f; Y`Xk ÀgW\Y'j Yfk YbXYh'k YfXYb"'8 UddYf'@UVg'Yf\_Ybbh'X]Y Bchk YbX][\_Y]h'Y]bYf'ghÀf\_YfYb'GYbg]V]`]g]Yfi b['Ubž'i a 'gY]bY DfcXi \_hY'ZØf'YXYb'g]W\YfYf'ni 'a UW\Ybž'XYf'X]Y'B: H!A Àf\_hY [Yb]Y» Yb'a ÒW\hY"'BUYYa '6Uk `Už'5ggcW]UhY'8]fYWhcf'cZ 7ca d`]UbW'VY]'8 UddYf'@UVgž'gU[hY.

B: Hg'g]bX'Y]bYf'XYf'gdUbbYbXghYb'6YfY]W\Y']b'XYf ?fmdhck À\fi b[ ž'UVYf'`Ub[ Zf]gh][ 'k YfXYb'g]Y'bi f YfZc`[ fY]W\'gY]bž'k Ybb'k ]f'i bgYfYb'?i bXYb'Y]bY'g]W\YfY I a [ YVi b[ '[ Yk À\f`Y]ghYb'\_ObbYb"

## B: H!6cca!ibX?YhhYbUbU`mgY!K UZZYb

K À\fYbX`B: Hg`Ui Z[ fi bX`]\fYg`[ Yf]b[ Yb`< UbXY`gj c`i a Ybg k Y]h[ Y\YbX`][ bcf]Yfh`k i fXYbž'ÀbXYfhY`g]W\`X]Yg`]b`X]YgYa `\J\f a ]h`B: H!Dfc^Y\_hYbž'X]Y`a Y\f`U`g`%`A ]``]UfXY`I G!8c``Uf`[ Y\UbXY`h k i fXYb"`8]Yg`\Uh`X]Y`6Ygcf[ b]g`ØVYf`X]Y`@Y[ ]h]a ]hÀh`XYf`]b gc`W\Yb`A Àf\_hYb`VYk Y[ hYb`A ]hhY``Yf\Ò\hž'k cVY]`I bhYfbY\a Yb k]Y`8UddYf`@UVg`ni bY\a YbX`VYgcf[ h`ØVYf`X]Y`K ]f\_gUa \_Y]h`XYf Yf[ f]ZZYbYb`7ca d`]UbWY!A U» bU\a Yb`q]bX"

8 UddYfr@UVgrk ]fXrnk Y] j YfgWk ]YXYbYr7\U]bU'mg]g!Hcc`g
Ubk YbXYb" 8 ]Y YfghY '\Y]» hr7\U]bU'mg]g? MHrf? bck 'Mci f
HfUbgUWh]cb\{\frac{z}{j}} cb 'XYf'XUg' I bhYfbY\a Yb 'VY\Ui dhYh\frac{z}XUgg'g]Y
]``Y[ U`Y'i bX'f]g\_UbhY'HfUbgU\_h]cbYb']b'9Wk hnY]h'\_YbbnY]WkbYb'i bX
8 UddYfr@UVg'VY]: Y\`j Yf\U`hYb'k UfbYb'\_Ubb" 8 Ug'UbXYfY'Hcc`\frac{z}XUg'XUg' I bhYfbY\a Yb'j Yfk YbXYb'k ]fX\frac{z}{j}ghr7\U]bU`mg]g'FYUWhcf\frac{z}a ]h'XYa 'XUg' I bhYfbY\a Yb'5bZfU[ Yb'ni 'i bX'UbgWk']Y» YbXYb
I bhYfgi Wki b[ Yb'ni 'YXYf'HfUbgU\_h]cb'ghY``Yb'\_Ubb"'8]YgY'Hcc`\g
g]bX'HY]`'XYg'7\U]bU`mg]g! 5fgYbU`g\frac{z}{i} a 'I bfY[ Y`a \handle a\rightarrow] [\_Y]hYb'\OVYf
X]YgYb'bYi Yb'5bk YbXi b[ g\frac{z}{U}``XYf'B: H!VUg]YfhYb'7ca d`]UbWY'ni
VY\_\had d\frac{z}{V}b"

 $K Ug `\ U`hYb `G]Y 'j cb `XYf `DUfhbYfgWX UZh'j cb `8 UddYf `@UVg a ]h'7 \ U]b U`mg]g3 `GU[ Yb `G]Y `Yg 'i bg ']a `? ca a YbhUfVYfY]WX i bhYb "$ 

6]`XbUWk Y]gY. G\i hhYfghcW\_žD]I UVUmžK ]\_]'7ca a cbg

fli bWh]cbfXž'gž']XŁ'o'j Uf''q̃ž'Z'g'1 'X"[Yh9`Ya Ybhg6mHU[BUa YfgŁQ\$Q']Z'fX"[Yh9`Ya Ybh6m=Xf]]XŁŁ'fYhi fb/'q̂'1 'X"WfYUhY9`Ya YbhfgŁ/'q̂"]X'1

 $\label{thm:condition} $$ ]X/`g"gfWI ~\hdg. ##WcbbYWh"ZUWYVcc_"bYh#YbSI G#gX_"`g_ I ZVa `1 %/ j Yfg]cb1 j ' "&"/'Z'g"dUfYbhBcXY"]bgYfh6YZcfYfl'gž'Z'gŁ/'qfKcW' a Ybhž fgWf]dhfž'fZUWYVcc_! ^ggX_flŁ/$ 

8 Y hU] `c

6Ygi WXYb G]Y i bg Ui Z \_fmdhc!bYk g"Uh