

A U[XYVi f[g'9`Vi ZYfdfca YbUXY k Y[Yb a UfcXYf'l ZYfa Ui Yf'[YgdYffh°

5V'XYa '%("'¬¬¬)'dfØZh'A U[XYVif['X]Y'VYgW\AX][hY I ZYfa Ui Yf'Ub'XYf'9`Vi ZYfdfca YbUXY'a]h'6c\fi b[Ybž'i a G]W\Yf\Y]hgf]g]_Yb'ni 'Yfa]hhY`b"



A U[XYVi f[\dot{z} '8 Yi hgW `Ub X '! '8]Y '9 `Vi ZYfdfca YbUXY ']b A U[XYVi f[\dot{z} 'Y]Vhj cfYfgh'i bVYbi hnVUf. '5 V A cbhU[\dot{z} 'XYa '%("' \dot{s} ') \dot{z} k YfXYb'i a \dot{z} Ub[fY]WXY'DfØZ b[Yb'Ub'XYf'I ZYfa Ui Yf j cf[Ybca a Yb"'8]YgY'A U» bU\a Y'k]fX'bchk YbX][\dot{z} 'bUWXXYa Yf\YV']WXY'GWXÀXYb'ZYgh[YghY``h'k i fXYb"'K]Y'X]Y'A 8 F'VYf]WXhYhz g]bX'a Y\fYfY'<c\`fÀi a Y']a '6Ui k Yf_'YbhXYW_h'k cfXYb \dot{z} 'Y]bYf a]ggh'YfghUi b`]WXY'j]Yf'A YhYf']b'XYf'6fY]hY'i bX'gYWXg'A YhYf']b XYf'<Ò\Y"'8]Y'GhUXhj Yfk U'hi b['\Uh'XU\Yf'XYb'5VgWXb]hh nk]gWXYb'XYf'Ghfca VfØW_Y'i bX'XYa 'FYghUi fUbh' 7i `]bUf]U [YgdYffh"'8]YgY'GhY``Y']gh'VYgcbXYfg'_f]h]gWX \dot{z} 'XU'g]Y'k Yb][Y<i bXYfh'A YhYf'j ca 'N]Y`cfh'XYf'8 Yi hgWX`UbXhci f'XYf'F UXdfcZ]g \dot{z} X]Y'Ua '&("'5i [i gh'YbXYh \dot{z} 'YbhZYfbh']Y[h"

8]Y'I ZYfa Ui Yf'[]`h'U`g'hY]`k Y]gY'a UfcXY'i bX']gh'XUa]h'Y]b G]W\Yf\Y]hgf]g]_c"'NU\`fY]W\Y'`cgY'A Ui Yfk Yf_gZi [Yb'n]Y\Yb'g]W\Ybh`Ub['XYg'[YgdYffhYb'K Y[Yg'i bX'a UW\Yb'Y]bY'gcZcfh][Y < UbX`i b[ga U» bU\a Y'i bi a [Àb[`]W\"5V'A cbhU['VY[]bbYb'X]Y 5fVY]hYb'a]h'\cf]ncbhU`Yb'6c\fi b[Yb'j cb'XYf': `i ggY]hY'Ui g'Ub]bg[YgUa h'g]YVYb'Di b_hYb"'8]YgY'gc``Yb'b]W\h'bi f'X]Y'GhUV]`]hÀh XYf'A Ui Yf'ØVYfdfØZYbž'gcbXYfb'Ui W\'_`ÀfYbž'cV'U`hY'A i b]h]cb Ui g'XYa 'Nk Y]hYb'K Y`h_f]Y[']a '6cXYb'j YfVcf[Yb'`]Y[hž'k]Y'b!hj Yf[Àbnh"

8f]b[YbXY'AU»bU\aYbibX'Ia'Y]hib[Yb

8]Y'GhUXh'A U[XYVI f['\Uh'Ui Z'X]Y'G]WXYf\Y]h']\fYf'6Øf[Yf'\ÒWXghYDf]cf]hÀh'[YgYhnh"'A]h'XYb'UbghY\YbXYb'I bhYfgi WXi b[Yb'k]fXUi WX'XYf'Dfca YbUXYbk Y['i bX'XYf'Ub[fYbnYbXY'; fØbghfY]ZYb']bX]Y'DfØZI b[Yb'Y]bVYnc[Yb"'8]YgY'6Ui [fi bXi bhYfgi WXi b[Yb'g]bXZØf'5bZUb['5i [i gh'Ub[YgYhnh"'8]Y'[YbUi Y'8Ui Yf'XYf'GdYffi b[']ghaca YbhUb'bcWX'i b[Yk]ggž'XcWX'Yg']gh'ZØf'6Øf[Yfa Y]ghYf'>Òf[FY\VUi a'fGD8Ł'j cb'YbhgWXY]XYbXYf'6YXYI hi b[ž'XUgg'X]Y5VgWXb]hhY'fYWXhnY]h]['j cf'XYf'8Yi hgWX`UbXhci f'ZfY][Y[YVYbkYfXYb''GWX`]Y>x`]WX'k YfXYb''Ua'HU['XYg'[fc>Yb'FUXfYbbYbgHUi gYbXY'Ni gWXUi Yf'Yfk UfhYh''

 $\label{thm:converse} Hfchn: XYf: 5VgdYffi: b[Yb:gWXY]bYb:j]Y`Y:FUXZUVfYf:ibX::i * [Åb[YfX]Y:KUfbV]bkY]gY:ni:][bcf]YfYb":8]Yg:ZØVfh:ni:Y]bYf:[YZÅVf`]WXYbG]hi:Uh]cbž:X]Y:Xf]b[YbX:ia[YVYbX:Ub[Y[Ub[Yb:kYfXYb:a:igg"8]Y:GhUXh:d`Ubh:XYgVU`V:nØ[][Ia:Y]hi:b[Yb:ZØf:XYb:FUX!:ibX:i*jYf_Y\fž:k]Y:X]Y:A]hhY:XYi:hgWXY:NY]hi:b[:VYf]WX:hYh":8Ua]h:gc``Yb:kY]hYfY:Nk]gWXYbZÅ``Y:jYfa]YXYb:ibX:X]Y:G]WXYfVY]h:XYfBi:hnYf:[Yk:À\f`Y]ghYh:kYfXYb"$

9]b'[ihYg'<\a\dagger XYf'D\ubib[']gh'[YZfU[h\u00e4xXYbb'bUW\'XYb [Yd\ubhYb'IbhYfgi W\ib[Yb'g]bX'kY]hYfY'6UiUfVY]hYb'bchkYbX][\u00e4 X]Y'Y]bY'YfbYihY'GdYffib['XYg'9\ViZYfg'nif':c\[Y'\UVYb'kYfXYb'' 8]Y'GhUXh'ghY\h'U\u00e4gc'jcf'Y]bYf'<YfUigZcfXYfib[\u00e4xX]Y'b]W\h'bif'X]Y\u00e40ZfUghfi_hif\u00e4gcbXYfb'UiW\'X]Y'9ffY]W\VUf_Y]h'Z\u00f'[fc\u00e4Y]Y'g]W\'X]Y\u00e4GhiUh]cb'Ybhk]\u00e4\u00e4fX'\u00e4\u00e4fX'\u00e4\u00e4fX'\u00e4\u00e4fX'\u00e4\u00e4fX'\u00e4\u00e4fX'\u00e4\u00e4fX'\u00e4\u00e4fX'\u00e4\u

8 Y hU]`g	
Cfh	AU[XYVif[ž'8YihgWX`UbX
EiY``Yb	• k k k "a Xf"XY
	• k k k "b!hj "XY
	• k k k "a n"XY

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