

Ÿf[Yf]b`XYf`FY[]chfUa.∵%*!À\f][Yf jYf`Yhnh'Ni[VY[`Y]hYf]b

%*!À\f][Yf`gcf[h`ZØf`5i ZfY[ib[`]b`XYf`FY[]chfUa. :U\fgWXY]b_cbhfc``Y`YbXYh`a]h`?ÒfdYfj Yf`Yhnib[`ibX 6Yhfi[gj YfXUWXh"

9]b J cfZU```]b XYf F Y[]chfUa . '> i [YbX`]WXY i bX]\fY < YfUi gZcfXYfi b[Yb]a 'ÒZZYbh`]WXYb BU\j Yf_Y\f

8Yf'JcfZU``

$8 | Y F Y U_h c b X Y f 6 Y h Y | \| h Y b$

=XYbh]hÀhibXaÒ[`]WXY?cbgYeiYbnYb

BUWW. XYa "JcfZU```]bZcfa]YfhY'X]Y'Ni [VY[`Y]hYf]b'X]Y
6i bXYgdc`]nY]ž'X]Y'gWWbY```ni f'GhY``Y'k Uf"'8]Y'6YUa hYb'_cbbhYb
ZYghghY``Ybž'XUgg'XYf'%*!-À\f][Y'Ui g'XYf'I _fU]bY'ghUa a h'i bX'Y]b
a Ò[`]WWYfk Y]gY'[YZÀ`gWWh'k]f_YbXYg'H]W_Yh'VY]']\a 'ZYgh[YghY``h
k i fXY"'8]Y'Dc`]nY]'\Uh'XUfUi Z\]b'9fa]hh`i b[Yb'Y]b[Y`Y]hYh'i bX'Y]b
GhfUZJ YfZU\fYb'k Y[Yb'? ÒfdYfj Yf`Yhni b['i bX'6Yhfi [g'[Y[Yb'XYb
i [YbX`]WWYb'YfÒZZbYh"

6YXYi hi b[ZØf X]Y; Ya Y]bgW UZh

8 Yf'J cfZU```k]fZh: fU[Yb`\]bg]W\h`]W\XYf'\DhY[fUh]cb'i bX'XYg
J Yf\U`hYbg'j cb'\[
| YbX`]W\Yb']a '\OZZYbh`]W\Yb'BU\] Yf_Y\f'Ui Z'
Gc`W\Y'G]hi Uh]cbYb'g]bX'b]W\h'bi f'ZØf'X]Y'VYhfcZZYbYb'DYfgcbYb
VY`UghYbX\[
| gcbXYfb'Ui W\ZØf'X]Y'; Ya Y]bgW\UZh\[
| X'Yy]bYb'
g]W\YfYb'i bX'fYgdY_hj c``Yb'I a [Ub[']a '\OZZYbh`]W\Yb'FUi a
Yfk UfhYh''9g']gh'k]W\h][\[
| Z'XUgg'gck c\`'\[
| YbX`]W\Y'U`g'Ui W\'X]Y
A]hUfVY]hYf']a '\OZZYbh`]W\Yb'BU\] Yf_Y\f'I bhYfghØhni b['Yf\U`hYbz'
i a 'gc`W\Y'?cbZ]_hY']b'Ni _i bZh'ni 'j Yfa Y]XYb''

8]Y : c [Yb ZØf XYb] i [Yb X]WX Yb

 $\label{thm:converse} Hfchn: XYf: YfbghYb: Jcfk @fZY:k i fXY: XYf: %*! $\A\f][Y:bUWX: XYb dc`]nY]`]WXYb: A U* bU\a Yb:k]YXYf: Ybh`UggYb: 8]Yg: XYi hYh: XUfUi Z \]bz: XUgg: XYf: JcfZU```b]WXh:bi f: fYWXh`]WXYz: gcbXYfb: Ui WX: gcn]U`Y =a d`]_Uh]cbYb: \Uhz: X]Y: HY]``Y]bYg: [fÖ* YfYb: A i ghYfg: jcb:?cbZ`]_hYb nk]gWXYb: jYfgWX]YXYbYb: YbYfUh]cbYb:]a 'OZZYbh`]WXYb: FUi a g]bX"$

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