

## Nk Y] HcmchU!8]YVghÀ\`Y`]b BYiVfUbXYbVif[.K Yf'\UhX]Y:U\fnYi[Y [YgY\Yb3

Nk Y] D? K !8]YVghÀ\`Y`]b BYi VfUbXYbVi f[ 'i bX`7Ufbck . Dc`]nY] gi W\h'NYi [ Yb ZØf`X]Y Ybhk YbXYhYb HcmchU! : U\fnYi [ Y"

\$%"\$, "&\$&( ` '%\$.' \$

Dc`]nY]]bgdY\_h]cb'BYi VfUbXYbVi f[

# 8]Y 5i gk ]f\_i b[ 'j cb 'D? K !8]Y V ghÀ\ `Y b 'Ui Z X]Y '; Ya Y]bgW UZh

BYi VfUbXYbVi f[ 'fchgŁ' 'K À\fYbX'X]Y'GhUXh'BYi VfUbXYbVi f[ g]W\'Ui Z'XYb'Gca a Yf'i bX'X]Y'XUa ]h'j YfVi bXYbY'I f`Ui VgnY]h j cfVYfY]hYhž'\_ca a h'Yg'ni 'Y]bYa 'VYgcf[ b]gYffY[ YbXYb'5bgh]Y[ j cb'D? K !8]YVghÀ\`Yb"'=bgVYgcbXYfY'Y]b'J cfZU``'Ua '' %"\$+"&\$&( []Vh'5b`Ugg'ni f'Gcf[ Yž'XU'Yg'XYb'5bgWXY]b'\Uhž'XUgg'X]Y'HÀhYf ]a a Yf'XfY]ghYf'j cf[ Y\Yb"

## 9fghYf'8]YVghU\`ibX'gY]bY':c`[Yb

5a Jcfa]hhU[ XYg" %"\$+"&\$&( kifXY'XYf'8]YVghU\`Y]bYg'HcmchU]b'BYiVfUbXYbVif[ [YaY`XYh"8]Y'Dc`]nY]'VYf]WkhYh'bib'jcbY]bYa kY]hYfYb'JcfZU``ž'XYf'g]Wk'nk]gWkYb'XYa &- "\$+"&\$&( ibXXYa'' %"\$+"&\$&( 'YfY)[ bYhY"'9]b'fchYf'HcmchU'5if]gž'Y]b<mVf]XZU\fnYi[ ž'kifXY'k À\fYbX'X]YgYf'NY]h'UiZ'Y]bYa
ÒZZYbh`]WkYb'DUf\_d`Uhn']b'7Ufbck'#Kighfck'YbhkYbXYh"'8Ug
: U\fnYi[ [Y\ÒfhY'Y]bYa'If`UiVYfž'XYf'bib'c\bY'gY]b'5ihc

#### 8]Y; Ya Y]bgW UZhi bhYf 8fi W\_

8]Y:: c`[Yb'gc`W\Yf'GhfUZhUhYb'[Y\Yb'ØVYf'XYb'a UhYf]Y``Yb GW\UXYb'\]bUi g"'8Yf'[YgW\ÀhnhY'JYf`i gh'j cb'Yhk U'%) "\$\$\$'9i fc ]gh'ZØf'j ]Y`Y'A YbgW\Yb'Y]bY'Yf\YV`]W\Y'Gi a a Y"'8UfØVYf'\]bUi g k ÀW\gh']b'XYf'; Ya Y]bgW\UZh'Y]b'; YZØ\`'XYf'I bg]W\Yf\Y]h"'8]Y 9]bk c\bYf'ZfU[Yb'g]W\Ž'k]Y'g]W\Yf']\fY': U\fnYi [Y'g]bX'i bX k Y`W\Y'A U» bU\a Yb'Yf[f]ZZYb'k YfXYb'\_ObbYbž'i a 'X]Y'G]W\Yf\Y]h ni 'Yf\O\Yb"

#### 9fa ]hh`i b[ Yb'i bX'5i Zfi Z'ni f'A ]h\]`ZY

8]Y'Dc`]nY]'Yfa ]hhY`h'XYfnY]h']b'XYa :: U``'i bX'j Yfa i hYh'Y]bYb
Ni gUa a Yb\Ub[ 'nk ]gW\Yb'XYb'VY]XYb'[ Yghc\`YbYb': U\fnYi [ Yb"
8]YgY'9fa ]hh`i b[ Yb'g]bX'YbhgW\Y]XYbXž'i a 'a Ò[ `]W\Y'HÀhYf'ni
]XYbh]Z]n]YfYb'i bX'ni \_ØbZh][ Y'8]YVghÀ\`Y'ni 'j Yf\]bXYfb"
DYfgcbYbž'X]Y'<]bk Y]gY'ni a 'J YfV`Y]V'XYg'fchYb'HcmchU'5i f]g
cXYf'UbXYfYb'fY`Yj UbhYb'\Dc`aZcfa Uh]cbYb'\UVYbž'k YfXYb'Xf]b[ YbX
[ YVYhYbž'g]W\'VY]'XYf'Dc`]nY]'ni 'a Y`XYb"'8]Yg'\_Ubb'Ybhk YXYf
ØVYf'XUg'Dc`]nY]\Ui dhfYj ]Yf'BYi ghfY`]hn'cXYf'X]Y'Cb`]bYk UW\Y'XYf

### < UbX`i b[gVYXUfZ'ZØf'X]Y'; Ya Y]bgWXUZh

8]Y'5bk c\bYf'k YfXYb'Yfa i h][ hž'k UW\gUa 'ni 'gY]b'i bX
j YfXÀW\h][ Y'5\_h]j ]hÀhYb'ni 'a Y`XYb"'8]Y'Dc`]nY]'\_Ubb'bi f'XUbb
YZZY\_h]j 'U[ ]YfYbž'k Ybb'g]Y'X]Y'I bhYfghØhni b[ 'XYf'; Ya Y]bXY
Yf\À`h"'-b'NY]hYb'XYf'Yf\Ò\hYb'?f]a ]bU`]hÀh']gh'Yg'k ]W\h][ Yf'XYbb
Yž'XUgg'g]W\'X]Y'6Øf[ Yf]bbYb'i bX'6Øf[ Yf'ni gUa a Yb[ YgW\`cggYbž
i a 'X]Y'G]W\Yf\Y]h']b']\fYf'I a [ YVi b[ 'ni '[ Yk À\f`Y]ghYb"

 $\label{eq:force_force} F \varnothing W\_Z\!fU[\ Y b `V] hhY `Ub .$ 

5bXfÅ 6ÒhhWXYf

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Dc`]nY]]bgdY_h]cb'BYi VfUbXYbVi f[

DfYggYghY``Y'Dc`]nY]]bgdY_h]cb'BYi VfUbXYbVi f[

HY`YZcb.'$' -) #) ), &!) $$+

9!A U]`.'dfYggYghY``Y!d]"bYi VfUbXYbVi f[ 4 dc`]nY]"a j !fY[ ]Yfi b[ "XY

k k k "]bghU[ fUa "Wca #dc`]nY]"a j "a gY

Hk ]hhYf.''

Cf][ ]bU`!7cbhYbh'j cb.'Dc`]nY]]bgdY_h]cb'BYi VfUbXYbVi f[ ž
ØVYfa ]hhY`h'Xi fWX'bYk g'U_hi Y``

'B5;
```

#### 8 YhU]`g

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