

# **ARTS2065**

# 7ci fgY'Cj Yfj ]Yk

### GHJZZ7cbHJWh8YHJ]`g

### 7cbj Ybcfg

B Ua Y	9a U]`	5j U]`UV]`]lm	@cWJhjcb	D\cbY
5a ]b DU`Ub[]	U"dU`Ub[]4 i bgk "YXi "Ui	: ]bX`XYHJ]`g`cb A ccX`Y	' ‰C FcVYfh KYVghYf	

### GWkcc~7cbhJWh~abZcfa Uh]cb

GVXcc``cZhY`5fhg`UbX`AYX]U

Fcca ' %&ž@YjY`' žFcVYfhK YVghYf6i]`X]b[fl %(Ł

D\cbY. f\$&£'-',) '(,) \*

9a U]` gUa 4 i bgk "YXi "Ui

K YVq]hY. k k k "Ufhq"i bak "YXi "Ui #qUa

 $\label{eq:hamiltonian} $$HY'GWKcc``cZhY'5ftg'UbX'AYX]U'kci`X``]_Y'hc'FYgdYWM\cong \cong m5W_bck`YX[Y'h\Y'HfUX]hjcbU``7ighcX]Ubgžh\Y'6YXY[U'`fPYbg]b[hcb'WJadigŁž'; UX][U'`fP]hmUbX'5fh\/'8Yg][b'7UadigYgŁ'UbX'h\Y'B[ibbUkU`dYcd'Y'fbighfU`]Ub'8YZYbW': cf\W'5\WJXYam]b'7UbVYffUŁ'cZh\Y'`UbXg'k\YfY'YUW\'WJadig'cZIBGK']g`c\WJhYX''$ 

# 7ci fgY 8YHJ] g

### 7 fYX]hDc]bhg \* \*

### Gi a a UfmcZh\Y 7ci fgY

H\]g`Wci fgY`dfcj ]XYg`mci `k ]h\`U`dfUWj\W\`i bXYfghUbX]b[ `cZZ]a ``Ub[i U[Yž'bUffUh]j Y`UbX`dfY!dfcXi Wjcb dfcWiggYg"'6mYl d`cf]b[ `h\Y`Wcbghfi Wjcb`UbX`i gY`cZ]a U[Yg`UbX`gci bXg`h\fci [\`k cf\_g\cd`Yl YfWjgYg UbX`WJgY`ghi X]Yg`cZgdYWjZJWZ]a `dfUWj\W`gž'mci `k ]```[U]b`Ub`i bXYfghUbX]b[ `cZh\Y`hYW\b]WU`žUYgh\YhJWUbX gYbgcfmk cf\_]b[ g`cZgdYYYD`dfcXi Wjcb"'Mci `k ]```XYj Y`cd`U`VUg]Wi bXYfghUbX]b[ `cZ\\x'Z]a ``Ub[i U[Y k cf\_g`UbX`]b`gc`Xc]b[ `k ]```XYj Y`cd`Ub`i bXYfghUbX]b[ `cZh\Y`WfYUh]j Y`dchYbhJU``cZh\Y`a YX]i a "'-b`h\]g Wci fgY`mci `k ]```Yl d`cfY`k Umg`cZdfYdUf]b[ `bUffUh]j Y`ci h]bYg`UbX`ghcfm\cUfXgž`YUfb`\ck `hc`WJdhi fY`UbX [YbYfUhY`]a U[Yg`UbX`gci bXgžYl dYf]a Ybhk ]h\`Yl ]gh]b[ `]a U[Yg`UbX`gci bXg`UbX`h\Y`YX]h]b[ `dfcWigg"`H\Y Wci fgY`k ]``Yl d`cfY`h\Y`WfYUh]j Y`dchYbhJU``cZUi X]c!j ]gi U``a YX]U`UbX`XYU``k ]h\`U`fUb[Y`cZdfUWj\WJ``UbX WcbWdhi U``dfcV`Ya g`]b`XYj Y`cd]b[ `[fci d`dfc^Y\wg"

### 7 ci fgY @YUfb]b[ 'Ci hWca Yg

- %" F YWc[ b]gY`UbX`XYa cbglfUlY`gca Y`cZh\Y`VUg]WWca a i b]WUl]cbžcf[ Ub]gUl]cbU``UbX`WcbW'dhi U` q\_]``g`fYei ]fYX`Zcf`WfYUlji Y`Wc``UVcfUlji Y`k cf\_
- &" 7 cbhYl hi U`]gY`UbX`UXUdhih\YcfYhJWJ``WcbWYdhg`fY[ UfX]b[ 'gci bX!]a U[ Y`fY`UhJcbgž'YX]hJb[ ž'UbX`g\ch ghfi Wi fY`hc`h\Y`UbU`mq]g`cZdUfhJW\`Uf`Z\`a 'dfUWJWYg`k]h\`dfUWJWU``Udd`]WUhJcbg
- ' "FYZYWicb'UbX']XYbhJZmh\Y'XYjY`cda YbhcZh\Y'WfYUhJjY'ci hWca Yg'hc'UXj UbW'g\_]``g']b |bXYdYbXYbhUbX'Wc``UVcfUhJjY'`YUfb]b[
- (" 7 cbW/)j YžfYgYUfW\ždfYdUfYžYX)hUbX`dfYgYbhUi X]c!j ]gi U``WcbW/dhgžghcfmVcUfXgž'd\chc!YggUmg UbX`gWf]dhg

# HYUW ]b[ 'GhfUhY[ ]Yg'

H\]g`Wci fgY`]g`ghfi Wh fYX`Ug`U`WfYUhjj]hm`XYj Y`cda YbhWci fgY`k]h\`\][\``Yj Y``Yl dYWfUhjcbg`cZdfcZ/gg]cbU` WcbXi Whz`fcVi gh`[fci d`XmbUa]\\dz`hY\\\b]\WU``dfcZ]\\]Yb\\mz`cb[c]b[`Zcfa Uhjj Y`ZYYXVU\\\_`UbX`U`gi ddcfhjj Y Ybj]fcba YbhZcf`WfYUhjj]hm'`9IYf\\]gYg`UfY`gYhhc`XYj Y`cd`dfU\\J\\W\`UbX`hY\\\b]\\W\``g\_]``g`h\Uhk]``[UfbYf`dYYf

# 5ggYgga Ybh

### 7c``UVcfUh]cb

5```ghi XYbhg`k ]```VY`Ug\_YX`hc`k cf\_`]b`[fci dg`Uhj Uf]ci g`ghU[Yg`Xi f]b['h\Y'Wci fgY"'=i]g`YggYbhJU``h\Uhmci UhhYbX`U```h\Y'd`Ubb]b[ž'X]gW gg]cb`UbX`dfY!dfcXi Wh]cb`a YYh]b[g'h\Uhmci 'UffUb[Y'Ug'U'[fci d"'H\Y'\_Ym h\]b[']g`Wca a i b]WUh]cb`k ]h\`mci f`[fci d"'H\YfY']g`bc`YI W gY`Zcf`X]gUddYUf]b['cf``UW\_cZWca a i b]WUh]cb" H\Y'dfY!dfcXi Wh]cb'dfcWigg`]g`Wc``UVcfUhjj Y`UbX`]h`]g`mci f`fYgdcbg]V]`]hmhc`XYj Y`cd'h\Y'bYWiggUfmg\_]``g ZcfYZZYWhj Y'hYUa k cf\_ž'Wca a i b]WUh]cb'UbX`WcbZ]WhfYgc`i h]cb"'H\YfY'UfY'gi VghUbhJU`'dYbU`h]Yg`Zcf'bch dUfhJW]dUh]b['UWhj Y`m]b`[fci d`k cf\_"

### Gi Va ]th]b[ '5gg][ ba Ybtg

+b cfXYf hc dUgg h\]g Wci fgY mci 'a i ghgYf]ci g`mUhhYa dh'UbX'gi Va ]h'5@h\Y'UggYgga Ybh'hUg\_g"

Mci 'g\ci `X'gi Va ]h'U``'mci f`k cf\_'j ]U'A ccX`Yž'Vi h'mci 'g\ci `X'U`gc'dfYgYbh']h'cb'mci f`]bX]j ]Xi U`'dcfh**z**c']c g]hYg"

K \Yb'gi Va ]hjb[ 'mci f'k cf\_ža U\_Y'gi fY']hjg'WYUfm]XYbhjZjYX'k ]h\'mci f'bUa Yžgh XYbhbi a VYfžh hcf'g bUa Y'UbX'dfc YWhjhY'"@UhY'gi Va ]gg]cbg'k ]```UhffUWhdYbU`hjYg"

## 5ggYgga Ybh'HUg\_g'

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5XUdh]b[ 'U'WUgg]W	(\$1	&' #%#&\$&\$`%%\$\$`DA	%ž&Ž Ž(
DfY!DfcXi Wjcb 8cW a YbrUrjcb	' \$ı	&' #/%#&\$&\$`%%\$\$`DA	% <u>%</u> %ž(

## 5ggYgga Ybh8YHJ]`g

5ggYgga Ybh% D\chc 9ggUm

GhUfhXUhY. Bch5dd`]WUV`Y

**@Yb[h**\. & hc 'a]bih/g

#### 8 YHJ]`g.

'!a]bi hY'g\cfriZ]`a'Wca dcgYX'cZY]h\Yf'cf][]bU``d\chc[fUd\g`cf']aU[Yg'Zfca'h\Y'ZJa]`mUfW\]j Y'hY``]b['UdYfgcbU``ghcfmk]h\'U'fYWcfXYX'jc]WY!cjYf'bUffUh]cb"'H\Y'dYfgcbU``bUffUh]j Y'g\cfhZ]`a']g'hc'VYUWcadUb]YX'VmU')\$\$!kcfX'Y!Y[Yg]g"'H\Y'ZcW'g']g'cb'U'WYUf'UbX'acj]b['bUffUh]jY'k]h\'YZZ]W]Ybhj ]giU`

ghcf ba Y ] ld%WcZWta

: YYXVUW\_dfcj ]XYX j ]U @A G UbX jhYfUhjj Y mXi f]b[ XYj Y cda Ybhh\fci [ \ XfUZrg"

### 5XX]h]cbU`XYhU]`g.

: ]bX'UXX]h]cbU``]bZcfa Uh]cb'cb'A ccX`Y"

Hi fb]hjb gYhjb[. H\]g ]g bchU Hi fb]hjb Ugg][ ba Ybh

5ggYgga Ybh& 5XUdhb[ U WUgg]W

GhUfhXUhY. Bch5dd`]WUV`Y

@Yb[h\.') a ]bi hYg

8YHJ]`g.

) !a ]b 'j ]XYc 'WfYUhYX 'Ug 'U '[ fci d "'H\Y '[ fci d 'k ]```gY`YWfzdfY!dfcXi Wfz`UbX`fYa U\_Y 'U ''WUgg]W'gWfbY 'Zfca Ub 'YI ]gh]b[ 'Z]`a "

8 Y WŁX

dYYf'UbX'gY`ZfYj]Yk 'XcW a YbhUhJcb"'Gh XYbhg'UfY'Yj U`i UhYX'cb'h\Y'cj YfU```ei U`]hmcZh\Y'XcW a YbhUhJcb UbX'gi Va ]gg]cb"'Gh XYbhg'UfY'Yj U`i UhYX'cb'h\Y]f'YZZYWfj Y`[ fci d'Wcbhf]Vi hJcbg"

: YYXVUW\_`]g`dfcj ]XYX`j ]U`@A GGh XYbhg`UfY`Yj U`i UhYX`cb`h\Y]f`YZZYWfj Y`[ fci \*

# 5 https://bxubwww.Fyei]fYaYbhg

 $\hbox{Ghi XYbhg'UfY'ghfcb[`m'YbWc'i fU[YX'hc'UhhYbX'U```WUggYg'UbX'fYj]Yk'``YWhfY'fY'WcfX]b[g''' } \\$ 

# 7ci fgY'GWXYXi `Y

### J ]Yk 'WUgg'h]a YhUV'Y

# H]a YtUV`Y

8 UhY	HmdY	7 cbhYbh		
K YY_'%'%('GYdhYa VYf'! %'GYdhYa VYf	Hcd]W	: ]`a 'Ug'5fhž'Gci bX'UbX'J]gi U``ghcfnhY``]b[ Ghfi Wi fYž'91 dYWUh]cbgž'5ggYgga Ybhž'DfY! dfcXi Wh]cb		
K YY_'&.'&%GYdhYa VYf'! &)'GYdhYa VYf	Hcd]W	: fca D\chc[fUd\mhc:]`a H\Y 9ggUm]gh]W5ddfcUVX		
K YY_" .'&, 'GYdhYa VYf'! &'C WcVYf	Hcd]W	Gci bX'a dUWhcb'a U[Y Gci bX'8Yg][bžF\mh\a 'UbX'A cbHJ[Y		
K YY_'(.') 'C WcVYf'!'- C WcVYf	Hcd]W	GWf]dhk f]hjb[ 7 \UfUWh/fz`D`ch'UbX`9ggUm]ghjWGci bX`GWf]dhg		
K YY_').'%&'CWcVYf'!'%* CWcVYf	Hcd]W	: ]`a '; fUa a Uf 7 ca dcg]h]cb'UbX'6`cW_]b[		
K YY_'*.'%-'CWcVYf'!'&' CWcVYf	F YUX]b[	F958-B; '#DFC817H-€B'K 99?		
K YY_'+.'&*'CWcVYf'!'' \$ CWcVYf	Hcd]W	7 ]bYa Utc[fUd\m Gtl[]b['th\Y'5Wgcb		
K YY_', .`&Bcj Ya VYf'!`* Bcj Ya VYf	Hcd]W	5 XUd HJHJc bg @ HY fUfm UbX': UWn U``5 XUd HJHJcb		
K YY_''-'Bcj Ya VYf'! % 'Bcj Ya VYf	Hcd]W	GWfYYb'7cbhYbh'Ghfi Whi fYg G\cfh: ]`a g'/ 'K YV!gYf]Yg		
K YY_'%\$.`%*`Bcj Ya VYf'! &\$`Bcj Ya VYf	Hcd]W	9X]h]b[ 'UbX'DcghdfcXi Wh]cb ±b'WUgg'dfYgYbhUh]cb'UbX'Z]bU`ZYYXVUW_"		

>UbY? bck 'Yg'A 5F G<5@'f%, , Ł'5b'  $\pm$ lfcXi Wf]cb'hc': ]'a Gci bX'' <u>\hd.##Z</u>'a gci bX"cf[  $\pm$  Ufg\U`\* $\pm$ bXYI "\ha\_

Hca`]bgcb'<C@A5Bz''+blfcXiWf]cb'zEag`VXad8[\_S`VFWWh[e[a`z'&bX'9X]h]cbz'6cghcb.:cWU``DfYggz'dd" | j ]]!||

? ">"'8 C B 9 @@Vif&\$\$) Łž'8 Ya cb]WDcggYgg]cb. '< cffcf': ]`a 'A i g]WžFZWE bWUfdWaXE ag` V, ? ge[U [ 8[^\_ S` V F WWh[e[a` ž'@cbXcb.'6: -₹dd"', , !%\$-

8 Uj ]X GCBB9BG7 < 9  $\pm$  f&\$\$%\pm2Y1 InfluWn2fca 'Eag` V 6 We[Y`, FZW7j bdWee[hWBai WdaX? ge[Ul Ha[UWl S` V Eag` V 7 XXWUfe [ 5 [ W\_ SzA ]W.UY`K ]YgY`DfcXi Wn]cbgzdd"'% \$! &%

### K YY\_")."GWf]dlk f]h]b[

>cbUth\Ub`8Uk gcb"; Ythjb['\\\\\Y\g'']b'EUdWWi dff'Y, 3?S`gS^f&\$\$\\CIZcfX'I b]'DfYgg

@U[cg\*9; F=f% \*\$L\*'DfYa]gY'žFZW3dfaX6dS\_Sf[U | d[f[YžG]acb/'GWkighYf."BMzdd""%!" %

 $\pm 0 [a Uf'69F; A 5B'f\% + + £'7f]Yg'/K \] gdYfg''fZfU[a Ybh£z'8agdEfad(We Tk; Y_Sd4WdY_S` z'5bWkcf6cc_g.'BMz'dd''') - !'* +$ 

#### .

### K YY\_\*. Glfi Wi fYg. G\cfh: ]`a g/ fk YVŁYd]gcX]W8fUa U

 $F \ ] \ W. \ UfX \ F \ Ug\_] b \ f \& \$ \& £ ``7 \ c \ ZZYY ``UbX ``7 \ ] [ \ UfY \ ffY \ g' F \ ZW3 \ df \ a \ XfZ \ WE \ Z \ [df \ 8 \ [Uf[a ` 8 [\_ ž'A \ W \ Uf`UbX . `>Y \ ZZY fgcbž B \ 7 \ "`Dd"' \ ^*! ( - ) ] .$ 

7 f]a a ]b[ g'/ ; fU\Ua 'fPXg"L'EZadf E [fW, D\WW f 3gefdS'[S` EZadf 8[ $^{\prime}$  ž'57 A  $\neq$  %\$\$( ž'fi `ck Yf[ ]f'fig\Wf]dhUbX gmbcdg]gždd', , !\%%

 $\label{eq:continuous} $$K_YV]gcXYgFYUX]b[.Cb`]bYFYgcifWfg'Z'gWfYYbW`hifY"bYh'Ui$ 

### K YY '+.'7]bYa Uhc[fUd\m

GhYj Yb? 5HN'f% - %L'GhcfmVcUfXg'ž8[\_ 6[dNUf[ Y, EZaf4k EZafžA ]WkUY`K ]YgY'DfcXi Whobgždd" &&! ((

GigUb 8K CF? ₽ f%, (Ł'AifXYf6mG\chg'ž6agTW6WBS^\_SžBYka Uf\_YhDfYgg. BMž'+-(%

K]```9 €B9F 'f%, ) Ł'H]a]b['ž5a\_ [Ue` EWcgW f[S^3dfzDccf\cigY DfYgg.: `cf]XUzdd"'&)!' %

GYf[Y]'9]gYbghY]b`f% (+Ł''7 c`ci f`UbX`A YUb]b['žFZW8[\\_ EW eWz@cbXcbz: UVYf'/: UVYfz'dd"'-&'-'%&

#### K YY\_', . '5 XUdhUhlcb'/ 'DfcXi Wlb[

; Ufm6cftc``]/ '@|bXU'<i hWxYcb''Cb't\Y'cf][ ]b'cZ5XUdhUh]cbg.'FYh\]b\_]b[ ': ]XY`]hm8]gWci fgY'UbX''Gi WWYgg"žBYk '@|hYfUfm<]ghcfmž'Jc`' , ž'Bc"' ž'Gi a a Yf'&\$\$+'dd"'((' '='(),

? Uh\ fmb `A ]``UfX. `f\\ XUdHUh\cb. `K f\\h\b\[ `Ug `F Yk f\\h\b\[ `UbX `F Z W > a ef F Z [` Yf\\b\ E Ud\\W\ i \ d\f\[ `Y [` S 6 [Y [fS^7 dS & \%\ \ZDU `[ fUj Y `A \WA ]``Ub `dd `++!- \*

DYHYFF 95 / '8"  $\neq$  J  $\Rightarrow$ ; 'f% - ) Ł'DfYdfcXi Whcb' ]b 'B da Vg U[ Y S` V 6 [dWUf[ Y fZWE Zadf 8 [ S` V H [VWał 6 cghcb. 'Zc WU' DfYgg

@bXUG9; 9F / '9Xk UfX K < 9HA CF 9 f% - (Ł'GbYU\_'dfYj ]Yk . 'h\Y 'a U[ b]ZJW bhf]g\_!hU\_Yfg'ž8da\_ E Ud[bf fa E UdWW , FZW5 a ^STadSf[hW3df a X8[^\_ \_ S] [ YžB M < Ybfm < c'h/ '7 ca dUbm

7\f]gh]bY'JUW.cb'f%-, ŁEZaa

.

### G5: 9HMGh XYbhGUZYhm! C WW dUh]cbU``< YU`h\`UbX`GUZYhm

±b 'h\ Y 'Yj YbhcZUb 'U\\\\]XYbhž'd`YUgY '\\c\bh\\\\f\-',) '%,\$

FYdcfhUbm]bW]XYbhg hc 7 ci fgY 7 cbj Ybcf#g"

±b a UbU[]b[ f]g\_h\YfY UfY h\fYY UgdYWg hc Wcbg]XYf.

- =\text{YbhjZmjb[ 'd\mg]WU``\UnUfXg...']"Y"'f]g\_'UggYgga YbhVmfYZYWnjb[ 'cb'mci f'k cf\_jb[ '`cWUhjcb'UbX mci f'k cf\_'dfUWnjWyg"
- $\bullet \ \ 5\,dd\ \ mb[\ \ 'ghfUhY[\ ]Yg\ 'Zcf\ 'dfYj\ Ybh]cb\ 'UbX\ 'Wcblfc\ ``cZf]g\_"$

# Gi Va ]gg]cb cZ5ggYgga YbhHUg\_g

# Hi fb]h]b Gi Va ]gg]cb

Image: Ybwci bhYf'U'dfcV'Ya k \Yb'UhYa dhjb['hc'gi Va ]hmci f'Ugg][ ba Ybhh\fci [\'Hi fb]h]bz'd'YUgY

HY'Yd\cbY'9| hYfbU''Gi ddcfhcb'-', ) "''' %cf'Ya U]''h\Ya 'cb'Y! hYfbU'hY'hgi ddcfh4 i bgk "YXi "Ui ""Gi ddcfh
\ci fg'UfY', .\$\$Ua '-'%\$.\$\$da 'cb'k YY\_XUmg'UbX'-.\$\$Ua '-').\$\$da 'cb'k YY\_YbXg'fl \*) 'XUmg'U'mYUft'''=\mathred{Image: Wa Jhmci f'Ugg][ ba YbhXi Y'hc'U'ZJi 'hk ]h\'Hi fb]h]b'mci 'a UmUdd'm\mathred{Image: Wa Jhmci f'Ugg][ ba YbhXi Y'hc'U'ZJi 'hk ]h\'Hi fb]h]b'mci 'a UmUdd'm\mathred{Image: Wa Jhmci f'Ugg][ ba YbhXi Y'hc'U'ZJi 'hk ]h\'Hi fb]h]b'mci 'a UmUdd'm\mathred{Image: Wa Jhmci f'Ub'Y! hYbg]cb\mathred{Image: Wa Jhmci h\Yf'f'Y'j UbhXcW a Ybhg\mathred{Image: Wa Uj''9! hYfbU''Gi ddcfhmci 'k ]'`

JbWi XY'Ug'Yj ]XYbW' hc'gi ddcfhmci f'Y! hYbg]cb'Udd']\wUh]cb"'\mathred{Image: Wa Uj''9! hYfbU''Gi ddcfhmci 'k ]'`

Ui hca Uh]\wU'`mfYW']j Y'U'h]\w\_Yhbi a VYf\mathred{Image: hY'Yd\cbY'mci 'k ]\tag{Y}\wu''mug\_'\mathred{Image: Wa'\mathred{Image: hY}\wu''mug\_'\mathred{Image: hY}\wu''mug\_'\mathred{Image: hY}\wu''mug\_'\mathred{Image: hY'Yd\cbY''mci 'k ]\tag{Y}\wu''mug\_'\mathred{Image: hY'\mathred{Image: hY'\mathred{I

; YbYfU``mž'UggYgga YbhiHug\_g'a i ghVY'gi Va ]hhYX'Y`YVWfcb]\W)``mij ]U'Y]h\Yf'Hi fb]h]b'cf'U'A ccX`Y Ugg][ ba Ybh'' =b']bgHJb\W'g'k \YfY'h\]g']g'bchdcgg]V`Yž']hk ]```VY'gHJhYX'cb'mci f'\\circ i fgY'g'A ccX`Y'g]hY'k ]h\U`hYfbUhjj Y'gi Va ]gg]cb'XYHJ]`g''

cfi]bZcfa Uhjcbicbi\ckihcigi Va ]hUgg][ ba Ybhgicbi]bYij ]UiA ccXiY.i\hdg.#gh XYbhi bgk "YXi "Ui #\ck! gi Va ]hUgg][ ba Ybha ccXiY

# 5 WUXYa ]W<cbYghmUbX D`U[]Uf]ga

D`U[]Uf]ga i]gii g]b[ih\Yik cfXgicfi]XYUgicZch\YfgiUbXidfYgYbh]b[ih\Ya iUgimci fick b"i=hWJbihU\_Yia Ubm Zcfa gžZfca iXYi]VYfUhYiWXYUh]b[ihciUWW]XYbhU`mWcdm]b[iZfca iUigci fWYik]h\ci hiUW\_bck iYX[Ya Ybh'

IBGK [fcidg'd'U[]Uf]ga ]bhc'h\Y'Zc``ck]b['WUhY[cf]Yg.

- i bXYfglUbX'mci f'f][\hg'UbX'fYgdcbg]V]`]h]Yg'Ug'U'gh XYbhUhi BGK
- VY 'Uk UfY 'cZd`U[]Uf]ga ž'Wcdmf][\hzil BGK 'Ghi XYbhi7cXY 'cZ7cbXi WhUbX '5VWWdhUV`Y`I gY 'cZ I BGK '=7 H'F Ygci fWYg'Dc`]Wh
- VY'Uk UfY'cZh\Y'ghUbXUfXg'cZVY\Uj]cif'YldYWhYX'cZYjYfmcbY']b'h\Y'l BGK 'Wcaaib]hm
- `cWUhY`gYfj ]WYg`UbX`]bZcfa Uh]cb`UVci hI BGK `UbX`I BGK `@]VfUfm

 $Gca\ Y\ `cZh\ YgY\ `UfYUg\ `k\ ]```VY\ `ZJa\ ]\ ]Uf\ `hc\ `mci\ \check{z}\ ch\ Yfg\ `k\ ]```VY\ `bYk\ "';\ U]b]b[\ 'U'gc\ `]X'i\ bXYfghUbX]b[\ 'cZU```h\ Y$ 

## 5 WUXYa ]W = b Zcfa Uh cb

: cf'YggYbhJU`'gh XYbh']bZcfa UhJcb'fY`UhJb['hc.

- fYei Yghg 'Zcf'Yl hYbg]cb/
- `UhY`gi Va ]gg]cbg`[ i ]XY`]bYg/
- fYj]Yk cZa Uf\_g/
- I BGK '< YU`h\ 'UbX'GUZYhm'dc`]W[Yg/
- YI Ua ]bUhcb dfcW/Xi fYq/
- gdYWJU`Wcbg]XYfUHjcb`]b`H\Y`Yj YbhcZ]``bYgg`cf`a ]gUXj Ybh fY/
- gh XYbhYei ]miUbX'X]qUV]`]m/
- UbX'ch\Yf'YggYbhJU`'UWUXYa ]W]bZcfa UhJcbž'gYY

\hdg.#k k k "Ufhg"i bgk "YXi "Ui #W ffYbhgh XYbhg#UWJXYa ]W]bZcfa Uh]cb#dfchcWc`g![i ]XY`]bYg#

.

### ⇒a U[Y'7fYX]h

=a U[Y'Zfca fDgmWkcfifb ZfYX'<]hWkWcW\_ž% \*\$Ł'UbX''DgmWkc''fl i g'J Ub GUbhz'% -, Ł"

### 7F = 7CG

7F=7CG'Dfcj]XYf'7cXY.'\$\$\$-,;

### 5W\_bck `YX[ Ya YbhcZ7ci bhfm

 $K Y : UW\underline{b} ck `YX[Y : h, Y : 6YXY[U : dY cd `Y : k \ c : UfY : h, Y : hfUX]h\underline{b} cb : `W ghcX]Ubg : cZh, Y ``UbXg : cb : k \ ]WX : I B G K ? Ybg]b[hcb : WUa di g : ]g ``cWUhYX''$