

# **MMAN9453**

A UghYfg Dfc YWi7

HYfa "H\fYY" ## "&\$&\$

### 9a U]`

<u>9b[]bYYf]b[ 'Gh XYbhGi ddcfhGYfj ]W</u>yg'-'W ffYbhgh XYbhYbei ]f]Yg

• Y"[""Ybfc`a Ybhž'dfc[fYgg]cbž'WUg\"fYei Yghgž'Wci fgY']ggi Yg'cf'dfc[fUa!fY`UhYX'ei Yf]Yg

<u>9b[]bYYf]b[ '±xi glf]U`'HfU]b]b[</u> '-'±xi glf]U`'lfU]b]b[ 'ei Ygl]cbg

<u>I BGK "Gh Xm5VfcUX"</u>—"gh XmUVfcUX"gh XYbhYbei ]f]Yg"fZcf"]bVci bX"gh XYbhgŁ

<u>I\_BGK\_'9| W.Ub[Y</u>'-'gh XYbhY| W.Ub[Y'Ybei]f]Yg'flcf']bVci bX'gh XYbhgŁ

I BGK : i h fY'Gh XYbhg'-'dchYbhJU'gh XYbhYbei ]f]Yg

• Y"["UXa]gg]cbgžZYYgždfc[fUagžWfYX]hlfUbgZYf

<u>GWXcc``CZZJWY</u>'--'GWXcc``[YbYfU``cZZJWY'UXa]b]ghfUh]cb'Ybei]f]Yg

• B6. h\Y fY`Yj UbhhYUa g``]ghYX UVcj Y a i ghVY WcbHUWYX -

gh XYbhYbei ]f]Yg

## 7ci fgY 8YHJ] g

## 7 fYX]h'Dc]bhg'('

## Gi a a UfmcZh\Y 7ci fgY

H\Y'dfc YWidfcj ]XYg'Ub'cddcfhi b]miZcfmci 'hc'Vf]b['hc[Yh\YfYb[]bYYf]b['df]bW]d`Yg`YUfbYX'cj Yf mci f'dfYj ]ci g'mYUfg'cZghi XmUbX'Udd`mh\YgY'df]bW]d`Yg'hc']bbcj Uh]j Y`mgc'j Y'dfcV'Ya g'gi W\'Ug'h\Y XYj Y`cda YbhcZU'gdYW]ZJWXYg][ bž'dfcWygg'UbX#cf'h\Y']bj Ygh][ Uh]cb'cZU'\mdch\Yg]g"'A UghYf'dfc YWg'UfY Wca d`Yl ž'cdYb!YbXYX'dfcV'Ya g'h\UhU``ck 'fcca 'Zcf'mci f'WfYUh]j ]mž'UbX'h\Y'UWei ]g]h]cbž'UbU`mg]g'UbX ]bhYfdfYhUh]cb'cZfYgi 'hg"'H\YfY'UfY'a i 'h]d`Y'dcgg]V`Y'gc'i h]cbg'cf'WcbWi g]cbg'Uhh\Y'ci hgYhUbX'gi ZJW]Ybh Wca d`Yl ]mhc 'fYei ]fY'U'XY[ fYY'cZdfc YWhd`Ubb]b[ "'H\Y'dfc YWhfYei ]fYg'mci 'hc'Zcfa i `UhY'dfcV'Ya g']b gW]YbhJZJWcf'Yb[]bYYf]b['hYfa gž'a UbU[Y'Ub'hYW\b]WU'dfc YWhUbX'Z]bX'gc`i h]cbg'VmUdd`m]b['gW]YbhJZJWUbX Yb[]bYYf]b['a Yh\cXg"'Mci 'k]``U'gc'XYj Y`cd'h\Y'UV]`]mhc'k cf\_']b'U'fYgYUfW\'UbX'XYj Y`cda Ybh Ybj ]fcba Ybh''Mci 'a i gh']XYbhJZmU'gi dYfj ]gcf'UbX'dfc YWhdf]cf'hc'Ybfc``]b[']b'h\]g'Wci fgY"'H\]g']g'h\Y'h\]fX Wci fgY'cZh\Y'' 'Wci fgY'dfc'YWhighfi WhifY"

## 7 ci fgY 5]a g

H\Y'h\Yg]g'dfcj ]XYg'Ub'cddcfhi b]hmZcf'h\Y'ghi XYbhhc'Vf]b['hc[Yh\Yf'Yb[]bYYf]b['df]b\Wd'Yg'YUfbYX'cj Yf h\Y]f'dfYj ]ci g'mYUfg'cZghi XmUbX'Udd`mh\YgY'df]b\Wd'Yg'hc']bbcj Uhji Y`mgc'j Y'dfcV'Ya g'gi \W.'Ug'h\Y XYj Y`cda YbhcZU'gdY\WZ\WXYg][ bž'dfc\W'gg'UbX#cf'h\Y']bj Ygh][ Uhjcb'cZU'\mdch\Yg]g''H\Yg]g'dfc'Y\Wg'a i gh VY'\ca d'Yl ž'cdYb!YbXYX'dfcV'Ya g'h\UhiU``ck 'fcca 'Zcf'ghi XYbh\WfVUhjj ]hmž'UbX'h\Y'U\\equi ]g]hjcbž'UbU'mg]g UbX']b\YfdfYhUhjcb'cZfYgi 'hg''H\YfY'a i ghVY'a i 'h]d'Y'dcgg]V'Y'gc'i hjcbg'cf'\Cb\Wi g]cbg'Uhih\Y'ci hgYhUbX gi \Z\W]Ybh\\ca d'Yl ]hm\c'fYei ]fY'U'XY[ fYY'cZdfc'Y\\fodalbb]b['Zca 'h\Y'ghi XYbh''H\Y'h\Yg]g'fYei ]fYg'h\Y ghi XYbhhc 'Zcfa i 'UhY'dfcV'Ya g']b'Yb[]bYYf]b['hYfa gž'a UbU[Y'Ub'Yb[]bYYf]b['dfc'Y\\hiUbX'Z]bX'gc'i hjcbg'Vm Udd`m]b['Yb[]bYYf]b['a Yh\cXg''Ghi XYbhg'U`gc'XYj Y`cd'h\Y]f'UV]`]mhc'k cf\_']b'U'fYgYUf\W.'UbX'XYj Y`cda Ybh Ybj ]fcba Ybh'

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

- %" 8 Yj Y`cd`U`XYg][ b`cf`U`dfcW'gg`cf`]bj Ygh][ UhY`U`\mdch\Yg]g`Zc``ck ]b[`]bXi ghfm'UbX`dfcZYgg]cbU` Yb[]bYYf]b[`ghUbXUfXg"`
- &" 7 f]h]WU``mifYZYWiicb 'U'gdYW]U`]ghiVcXmicZ\_bck `YX[Y'fY`UhYX'hc'h\Y]f'h\Yg]g'hcd]W'
- ' " 5dd`mgWYbh]ZWUbXYb[]bYYf]b[ a Yh\cXg`hc`gc`j Y`Ub`Yb[]bYYf]b[ dfcV`Ya "`
- ("5bU`mgY`XUHJ`cVYWNjY`mig]b[eiUbh]HJhjY`UbXaUh\YaUh]WJ`aYh\cXg"`
- ) "8 Ya cbglfUHY cfU`UbX k flHYb Wca a i blWUHcb lb dfcZygglcbU`UbX `UmXca U]bg":

## HYUW ]b[ GhfUhY[]Yg

H\Y`Wci fgY`]g`HJi [\h'Ug`Ub`]bX]j ]Xi U``fYgYUfW\`dfc`YWžhc`XYj Y`cd`U``Yj Y``cZfYgYUfW\`g\_]``g`UbX Ui hcbca m'

## 5ggYgga Ybh

## 5ggYgga Ybh'HUg\_g

5ggYgga Ybh'hUg_	K Y][ \h	8iY'8UHY	Gh XYbh@YUfb]b[ CihWcaYgʻ5ggYggYX
A UghYf'dfcYVhiUbX'fYdcfhi	*\$1	&\$#%#&\$&\$`\$).\$\$`DA	%ž˙( ž˙)
H\Yg]g`dfYgYbfUh]cb`	%\$I	&) #%#&\$&\$`\$%\$\$`DA	)
DUffjWjdUfjcb*fgi dYfj ]gcfŁ*	) ।	&+#%%#&\$&\$`\$).\$\$`DA	%ž <sup>*</sup> .&ž <sup>*</sup> ' ž <sup>*</sup> ( ž <sup>*</sup> )

## 5ggYgga Ybh'8YHJ]`g

5ggYgga Ybh% 'A UghYf dfc YWhUbX fYdcfh

8YHJ]`g.

.

 $: ]bU``h\ Yg]g`fYdcfh'? Sj ' " bSYWe /Wj U'gV[`Y SbbW V[UWe S`V dWWdW UWefž'] ] \\$ 

A Uf\_]b[ 'fi Vf]WUj U]`UV`Y 'cb'h\Y 'Wti fgY 'HYUa g'k YVg]hY"

.

5ggYgga Ybh& H\Yg]g dfYgYbhJh]cb

8YHJ]`g.

 $\label{eq:hamiltonian} \mbox{H\Yg]g\WcbZYfYbWY\"dfYgYb\HUh]cbz") 'a ]bi hYg\"\check{\mbox{Z}}\" 'a ]bi hY\"ei Ygh]cb\"h]a Y"$ 

A Uf\_]b[ 'fi Vf]WUj U]`UV`Y 'cb'h\Y 'Wti fgY 'HYUa g'k YVg]hY"

5ggYgga Ybh' DUfh]WdUh]cb fgi dYfj ]gcfŁ

8YHJ]`g.GidYfj]gcf`aUf\_`VUgYX`cb`h\Y`ghiXYbhfgi]bdih`UbX`dUfh]W]dUh]cb`cjYf`h\Y`H\Yg]g`dfcYWf`

F Ygci fWYg

FYWca a YbXYX FYgci fW/g

BchUj U]`UV`Y

7ci fgY 9j U`i Uh]cb UbX 8Yj Y`cda Ybh

@UVcfUhcfmK cf\_g\cd \dag{b}Zcfa Uh]cb

 $7\,C\,J = 8\,!\% B\,C\,H9. H\Y'GWkcc```UVcfUlrcfm'ZJWJ']hJYg'UfY'cdYb'hc'fYgYUfWk'hkYg]g'gh'XYbhg']b'H&/\kYjYfZ'UWW'gg']g``]a]h'X"''Hc'Wcad`mk]hk'[cjYfbaYbhfg'gcWJU'`X]ghUbWJb['fYei]fYaYbhgZY''['"Z'('geiUfY'aYhYfg'dYfdYfgcbZYUWk'fcca'\Ug'U'aUl]aia'WddUWJmm']a]h'Zk\]Wk'k]```VY'acb]hcfYX'Vmh\Y'gidYfj]g]b[dfcZYgg]cbU``ghUZZ''D`YUgY'WkYW_k]h\hkY'`UVcfUlrcfmcZJWf']b'mcif'UfYU'VYZcfY'UWW'gg]b['UbX'cVgYfjY'hkY']a]h'UbX'U```ch\Yf'gUZYmdfYWJihJcbg''$ 

Mci a i ghgYY\_[i ]XUbWYUbX'Uddfcj U``Zfca 'mci f'H\Yg]g'gi dYfj ]gcf'df]cf'hc'Ubm`UVcfUhcfmUWfj ]h]Yg"

 $\label{thm:convergence} H\Y ``UVcfUhcf] Yg ``Ufy `h, Y `fygdcbg]V]`] ImicZh, Y `ghUZI]b! WX, Uf[ Yž`UbX`mci `a i ghicdYfUhY`k ]h, ]b`h, Y `UWWYdhYX dfUWf] WY g`cZh, Y ``UVcfUhcfmiwbWYfbYX''`@UVcfUhcfmighUZUfY`\][ \`mg_]``YX`UbX`\Y`dZ` `\fu_Y`Z` ```UXj UbhU[ Y cZh, Y]f`YI dYf]YbWY\ck Yj Yfžmci `g\ci `X`bchYI dYWf`UVcfUhcfmighUZhc`hU_Y`fYgdcbg]V]`] ImiZcf`mci f`h, Yg]g cf`WUffmici hik cf_`Zcf`mci ''$ 

= mci f'dfc YWi]bj c'j Yg``UVcfUhcfmk cf\_= WcbHUWih\Y'c= YcZh\Y'`UVcfUhcfm']b'k\]W\'mci k]```VY'k cf\_]b[ 'Ug'gccb'Ug'dcgg]V'Y'hc'X]gW gg'mci f'fYei ]fYa Ybhg"'H\Ymk]```]ggi Y'mci 'k]h\'U'@UVcfUhcfm 5\WYgg'5ddfcj U'`f@55E'Zcfa 'k\]W\'mci 'a i gh'Wca d'YhY'UbX'fYh fb'hc'h\Y'C=7"

 $\begin{array}{l} \underline{: cf'a \ cfY']bZcfa \ Uhjcb'UVci \ hUWWgg]b[\ 'h\ Y'GV\&cc''g'`UVcfUhcf]Yg\check{z}'d`YUgY'j \ ]g]hh\ Y'GV\&cc'} \\ \underline{k \ YVg]hY. \ \ 'hdg. \#k \ k \ "Yb[\ ]bYYf]b[\ "i \ bgk \ "YXi \ "Ui \ \#a \ YV\ Ub]WU'!Yb[\ ]bYYf]b[\ \#Ygci \ fWrg\#UV!UWWgg!\ \ Lk \ !hc! \ Zcfa \ q \\ \end{array}$ 

#### K cf q\cd

5```ghi XYbh`UWhj ]hjYgʻfYei ]f]b[ 'a Ubi ZJWhi fY`]b'h\Y`A YVX\Ub]WU``UbX`A Ubi ZJWhi f]b[ '9b[ ]bYYf]b[ 'fA A 9Ł k cf\_g\cd'g\ci `X`VY`X]gW ggYX`k ]h\`h\Y`k cf\_g\cd'dYfgcbbY``Uhh\Y`]bWYdh]cb'cZh\Y`k cf\_"'H\Y`k cf\_g\cd'dYfgcbbY``a i ghi\Uj Y`h\Y`cddcfhi b]hmhc'UXj ]gY`UbX`]bZi YbWY`h\Y`XYg][ b'hc'\Y`d'a ]b]a ]gY`UggYa V`mž a Ubi ZJWhi fY`cf'Z bWhcbU``dfcV`Ya q"

H\Y'k cf\_g\cd']g'i gi U``m]b'j Yfm\][\'XYa UbX"'=\mathrix mci 'fYei ]fY'h\Y'k cf\_g\cd'hc'a Ubi \mathrix Yei ]da Ybh YggYbh]U`hc'mci f'h\Yg]g\tin\Y'b'a U\_Y'gi fY'h\Uhmci 'X]g\W gg'mci f'fYei ]fYa Ybhg'Ug'YUf'mUg'dcgg]V`Y'k ]h\'h\Y K cf\_g\cd\@UVcfUhcfmA UbU[\Yf''\Mci 'g\ci `X'dfcj ]XY'Yb[\]b\YYf]b[\'XfUk ]b[\g'k\]\W 'UfY'\namedafcj YX'Vm h\Y'`\UVcfUhcfmC=\mathrix "\Mci 'g\ci `X'a U\_Y'Yj YfmY\mathrix fhhc'a ]b]a ]gY'h\Y'K cf\_g\cd'\cux'Vma cX]\mathrix mathrix a U\_Y'Yj YfmY\mathrix fhhc'a ]b]a ]gY'h\Y'K cf\_g\cd'\cux'Vma cX]\mathrix mathrix mathrix a U\_Y'Yj YfmY\mathrix fhhc'a ]b]a ]gY'h\Y'K cf\_g\cd'\cux'Vma cX]\mathrix mathrix mathrix a U\_Y'Yj YfmY\mathrix mci f'XYq][\bg'\gamma a \text{Y}''\]

UggYgga YbhidYfZcfa UbWYžmci 'UfY'Y`][]V`Y`hc'Udd`m'Zcf'GdYWJU``7cbg]XYfUhJcb'df]cf'hc'gi Va]htjb['UbUggYgga Ybhicf'g]htjb['Ub'Yl Ua"

: cf`XYhJ]`g`cZUdd`m]b[ 'Zcf`GdYW]U``7cbg]XYfUh]cb`UbX`WcbX]h]cbg`Zcf`h\Y`Uk UfX`cZgi dd`Ya YbhUfm UggYgga Ybhž'd`YUgY`gYY`h\Y`]bZcfa Uh]cb`cb`I BGK 'g`<u>GdYW]U``7cbg]XYfUh]cb`dU[Y</u>"

D`YUgY'bchY'h\Uhghi XYbhg'k]``bch'VY'fYei]fYX'hc'dfcj]XY'Ubm'XcW'a YbhUfm'Yj]XYbWY'hc gi ddcfh'UVgYbWg'Zfca 'Ubm'WUggYg'a]ggYX'**VYWUi gY'cZ'7CJ=8!%** 'di V`]W\YU'h\ 'a YUgi fYg'gi W\'Ug]gc`Uh]cb"'| BGK 'k]``bch'VY']bg]gh]b[ 'cb'a YX]WU`'VW'fh]ZJWUh'Yg'Zfca 'UbmcbY'XYYa YX'hc'VY'U'dcg]h]j Y'WUgYZ cf'k\Yb'h\Ym\Uj Y'fYWcj YfYX"'Gi W\'WYfh]ZJWUh'Yg'UfY'X]ZZJW 'hhc'cVhU]b'UbX'di h'Ub'i bbYWYggUfmghfU]b'cb ghi XYbhg'UbX'a YX]WU`'ghUZZ''

 $5 \ dd^{\wdf} \ duff \ duff$ 

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

 $\label{thm:continuous} IBGK ``Ug`Ub`cb[c]b[`Wcaa]haYbhhc`ZcghYf]b[``U`W``hifY`cZ`YUfb]b[`]bZcfaYX`VmUWUXYa]W]bHY[f]hm'`5``IBGK ``ghiXYbhg``UjY`U`fYgdcbg]V]`]hmhc`UX\YfY`hc`h\]g`df]bW]d`Y`cZUWUXYa]W]bHY[f]hm'`D`U[]Uf]gaibXYfa]bYg`UWUXYa]W]bHY[f]hmUbX`]g`bchhc`YfUhYX`UhIBGK "`B'SY[Sde_SfG@EI[eVW{`WSege[YfZW_aXSekagdai`ž$ 

Mci 'UfY'U'gc'fYa ]bXYX'h\UhWUfYZ ``Hja Y'a UbU[ Ya Ybh']g'Ub']a dcffUbhdUfhcZgh XmUbX'cbY'cZh\Y ]XYbhJZYX'WUi gYg'cZd`U[ ]Uf]ga ']g'dccf'hja Y'a UbU[ Ya Ybh''Gh XYbhg'g\ci `X'U``ck 'gi ZZWYbh'Hja Y'Zcf fYgYUfW\žXfUZf]b[ 'UbX'h\Y'dfcdYf'fYZYfYbW]b[ 'cZgci fWYg']b'dfYdUf]b[ 'U```UggYgga Ybh'HJg\_g''

₹d`U[]Uf]ga i]gʻZci bXi]bimci fik cf\_ik \Ybimci 'UfYi]bʻZ[fghmYUfžimci fi`YWi fYfik]``cZYfimci 'Ugg]ghUbWYihc
]a dfcj Yimci fi'UWUXYa]Wg\_]``g'''H\Yma UmUg\_imci ihci`cc\_'Uhigca Yicb`]bYifYgci fWygžiUhhYbXih\Yi@YUfb]b[
7 YbhfYžcfigca Yh]a YgifYgi Va]himci fik cf\_ik]h\h\YidfcV`Ya iZ[l YX'''< ck Yj Yfia cfYigYf]ci gi]bghUbWygi]biZ[fgh
mYUfžigi W\ugighYU`]b[iUbch\Yfighi XYbhgik cf\_icfidUm]b[igca YcbYihciXcimci fik cf\_žia UmVYi]bj Ygh][UhYX
i bXYfih\YiGhi XYbhA]gWcbXi WhDfcWYXi fYg''

FYdYUHYX'd`U[]Uf]ga 'fYj Yb']b'Z|fghmYUfłź'd`U[]Uf]ga 'UZHYf'Z|fghmYUfźcf'gYf]ci g']bghUbWYgža Um'U`gc'VY ]bj Ygh][UhYX'i bXYf'h\Y'Gh XYbhA ]gWcbXi WhDfcWYXi fYg"'H\Y'dYbU'h]Yg'i bXYf'h\Y'dfcWYXi fYg'WUb']bWi XY U'fYXi Whcb']b'a Uf\_gž'ZU]`]b['U'Wci fgY'cf'Zcf'h\Y'a cghgYf]ci g'a UhHYfg'fi]\_Y'd`U[]Uf]ga ']b'Ub'\cbci fg h\Yg]gŁYj Yb'gi gdYbg]cb'Zfca 'h\Y'i b]j Yfg]mm''H\Y'Gh XYbhA ]gWcbXi WhDfcWYXi fYg'UfY'Uj U]`UV'Y'\YfY.

kkk"[g"i bgk"YXi"Ui #dc]Wn#XcWa Ybhg#ghi XYbha ]gWcbXi WhdfcWYXi fYg"dXZ

## 5 WUXYa ]W±bZcfa Uh]cb

## 7 fYX]hdc]bhg

7 ci fgY'WfYX]hi]g'WU'W'`UhYX']b'I b]hg!C Zi 7 fYX]hifl C 7 L"'H\Y'bcfa U``k cf\_`cUX'YI dYWfUh]cb'Zcf'cbY'I C 7 ]g'UddfcI ]a UhY`m'&) '\ci fg'dYf'hYfa "'H\]g']bWi XYg'WUgg'WcbhUWh'\ci fgž'df]j UhY'ghi Xmž'ch\Yf'`YUfb]b[ UWfj] ]h]Ygž'dfYdUfUh]cb'UbX'h]a Y'gdYbh'cb'U``'UggYggUV`Y'k cf\_"

A cgh'Wci fgYk cf\_'Wci fgYg'Uhl BGK 'UfY'\*'I C 7 'UbX']bj c`j Y'Ub'Ygh]a UhYX'%) \$`\ci fg'hc'Wca d`YhY'''9UW\ Wci fgY']bWi XYg'U'dfYgWf]VYX'bi a VYf'cZ\ci fg'dYf'k YY\_'fl\#\ Ł'cZgW\YXi `YX'ZJ\WY!hc!ZJ\W''UbX#cf'cb`]bY WcbhJ\W''5bmUXX]h]cbU`'hja Y'VYmcbX'h\Y'dfYg\fy]VYX'WcbhJ\Wi\ci fg'g\ci `X'VY'gdYbh]b'a U\_]b['gi fY'h\Uhmci ii bXYfghJbX'h\Y''YWfi fY'a UhYf]U'ž'Wca d'Yh]b['h\Y'gYhUgg][ ba Ybhgž'Z fh\Yf'fYUX]b['ž'UbX'fYj ]g]b['Zcf UbmYl Ua ]bUh]cbg"

## Cb!WUa di g WUgg UHYbXUbW

Di V`]WX]gHJbW]b[ `WcbX]h]cbg'a i gh'VY`Zc``ck YX`Zcf'U```H' `ZJ\WY!hc!ZJ\WY`WUggYg":Hc`Ybgi fY`h\]gž'cb`m ghi XYbhg`Ybfc``YX`]b`h\cgY`WUggYg'k]```VY`U``ck YX`]b`h\Y`fcca "'7`Ugg`fcghYfg`k]```VY`UhtUW\YX`hc WcffYgdcbX]b[ `fcca g`UbX`W]fW``UhYX`Ua cb[ ```UV`XYa cbghfUhcfg"'Bc'cj Yf!Ybfc`a Ybh]g`U``ck YX`]b`ZJ\WY!hc! ZJ\WY`WUgg"'Ghi XYbhg`Ybfc``YX`]b`cb`]bY`WUggYg`WJb`gk Ud`h\Y]f`Ybfc`a YbhZca 'cb`]bY`hc'ch\Yf`UXX]h]cbU`ž' Vi h`]a ]hYXž'bi a VYf`cZcb!WJa di g`WUggYg`VmGi bXUmž'K YY\_'%"'D`YUgY`fYZYf`hc`mci f`Wci fgYfg`A ]\WcgcZh HYUa g`UbX`A ccX`Y`g]hYg`Zcf'a cfY`]bZcfa Uh]cb`UVci h`WUgg`UhhYbXUbWY`Zcf']b!dYfgcb`UbX`cb`]bY`WUgg gY\M]cbg#J\Mj] ]h]Yg"

 $\label{thmuh} $$ Mci f'Yu'h' `UbX'h'Y'YU'h' `cZh'cgY']b'mci f'WUgg']g'Wf]hJWU'`m]a dcfhUbh''Mci 'a i ghghUmUh'\ca Y']Zmci 'UfY g]W_'cf'\Uj Y'VYYb'UXj ]gYX'hc'gY'Z]gc`UhY'VmBGK_'\YU'h' `cf'[cj Yfba Ybh'Ui h'\cf]hJYg'''7 i ffYbh'U'Yfhg'UbX'U `]gh'cZ\chgdchg'WUb'VY'Zci bX'$ 

a dcfhUbh'@]b\_g