

# **ARTS2125**

5W]b['UbX'DYfZcfa]b[



## 7ci fgY<sup>\*</sup>Cj Yfj ]Yk

## GhJZZ 7 cbhJWh 8 YhJ] g

## 7cbj Ybcfg

B Ua Y	9a U]`	5j U]`UV]`]m	@cWUh]cb	D\cbY
AY[ Aia ZcfX	a "a i a ZcfX4 i bgk "YXi "Ui	: f]XUm-!%Ua cb`]bY'!']bX]j ]Xi U` W:bgi `HJH]cbg'Vm Ya U]` Uddc]bha YbH'	Fcca '%% KYVghYf'6`X[	-',)'(,*)

## Hi hcfg

B Ua Y	9a U]`	5j U]`UV]`]m	@cWUhjcb	D\cbY
DUi ``A Uth\Yk g	d"a Ulth\Yk g4 i bgk "YXi "Ui	D`YUgY'Ya U]`'DUi` kc'UffUb[Y'U W&bgi`kUk]cb"	€ A mYfg Gh X]c	-',)')'+,
A Uf_'A ]HWXY``	a "a ]h/XY``4 i bgk "YXi "Ui	D`YUgY'Ya U]`A Uf_ lc`UffUb[Y'U W&bgi`hUlf]cb"	€ A mYfg Gh X]c	-',)'(,*'

GWXcc`7cbHJWh ≠bZcfa Uh]cb

GWLcc``cZhLY`5fhg`UbX`AYX]U

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

I BGK '5fhgž'8Yg][b'UbX'5fW]hYWhifY'?Ybg]b[hcb'UbX'DUXX]b[hcb'WUadigYg'UfY'Vi]hhcb'5Vcf][]bU`

## 7ci fgY 8YHJ] g

### $I b h c Z 7 f Y X h^*$

## Gi a a UfmcZh\Y 7ci fgY

K \Uhiufy`uWtcfg`Xc]b['k\Yb'h\YmdYfZcfa 3'K\mXc`UWtcfg`Vi]'X`W\UfUWfYfg`UbX`Yb[U[Y`gdYWtUtcfg`]b gi W\X]ZZYfYbhk Umg3'<ck `XcYg`UWf]b[ 'Ya VcXmVY`]YZg`UVci hh\Y`k cfX`UbX`k\c`k Y`UfY3'H\YfY`UfY`a Ubm ghm`Yg`cZUWf]b['UbX`Yl dYf]YbWX`UWtcfg`XfUk `cb'j Uf]ci g`hYW\b]ei Yg"'\d'h\]g`Wci fgY`mci `k]```Yl d`cfY`Vch\UWf]b['UbX`dYfZcfa]b['UbX`]b`h\YcfmUbX`dfUWf]W\"''H\]g`k]```]bj c`j Y``cc\_]b[']bhc`a U^cf`UddfcUW\Yg`hc UWtcf'hfU]b]b['gi W\`Ug'h\cgY`XYj Y`cdYX`VmGhUb]g`Uj g\_mžA YmYf\c`Xž`6fYW\hž; fchck g\_]ž`UbX\cf'6cU`"'Mci k]```YUfb`\ck 'h\Y]f`UddfcUW\Yg`Wcbgh]h hY`fYgdcbgYg`hc`h\Y`]ggi Yg`cZh\Y]f`XUmžUbX`\ck 'a cXYfb]gh a cXYg`cZUWf]b['\Uj Y`VYYb'hfUbgZcfa YX`Vmdcgha cXYfb'dYfZcfa Yfg"'H\Y`Wci fgY`Wca V]bYg``YWh fY`UbX hi hcf]U`hYUW\]b['\k]h`ghi X]c!VUgYX`k cf\_g\cdg"'\d'w\`a ]bUhYg`]b`U`[ fci d'dfYgYbhUh]cb'h\Uhg\ck WUgYg`U fUb[Y`cZUddfcUW\Yg`hc'dYfZcfa]b["

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

- %" XYa cbglfUhY`Ub`i bXYfghUbX]b[`cZh\Y`k Umih\Y`UWrcffig`f]E`UddfcUW\`rc`UgdYWrg`cZhYI hifW\UfUWrYf UbX`d`ch`]b`dUfh]Wi`UfE`UbX`f]]E'h\Y`f'dgm\\c!d\mg]\WJ``k cf\_'Ya VcXmigdY\\JZ]\WfYgdcbgYg`hc`h\Y`U\Wcffig\\]qhcf\WJ``UbX`W``hi fU``WcbhYI h
- &" XYa cbglfUhY`Ub`UV]`]mihc`]XYbh]Zmih\Y`]XYc`c[]\W\``bUhi fY`cZX]ZZYfYbh\UddfcU\\Yg`hc`h\Y`fY`Uh]cb\\YYb`U\\cf
- "XYa cbglfUhY`Ub`Uk UfYbYgg`cZh\Y`W\Ub[Yg`UbX`W&bl]bi]h]Yg`]b`U`dfUW]h]cbYffg`UddfcUW\`cj Yf`h]a Y hc`h\Y`h\YcfmUbX`dfUW]W\`cZUW]b[ž`Ug`k Y```Ug`Ub`UV]`]mhc``cWUhY`a ca Ybhg`cZW&bj Yf[YbW\`UbXX]j Yf[YbW\`VYlk YYb`h\UndfUW]h]cbYffg`h\YcfmUbX`dfUW]W\
- ("XYa cbglfUhY`Ub`UV]`]lmihc`Yb[U[Y`]b`Vch\`Wc[b]hjjY``]b[i]gh]WUbX`Ya VcX]YX``YUfb]b[/UbX`Ub`UV]`]lmihc`fYZYWicb`h\Y`fY`Uhjcb`VYlk\YYb`]XYUgžWcbhYl hg`UbX`VcX]Yq
- ) " h\Y`XYj Y`cda YbhcZ]bXYdYbXYbhfYgYUfW\`UbX`UbU`mg]g`g\_]``gž`Ug`k Y```Ug`g\_]``g`fY`Yj Ubhhc`h\Y YgHUV`]g\a YbhcZUb`cf[ Ub]nYXž`\Ufa cb]ci g`UbX`Wcbghfi Whj Y`YbgYa V`Y`hYUa

### HYUWX]b[ 'GhfUhY[]Yq'

### 7cbhYbhFUhcbU`Y

### @YUfb]b[ 'UbX'HYUW\]b[ '5ddfcUW\

5FGH&&) `]g`ghfi WhifYX`Ug`U`Wca V]bUh]cb`cZ`YWhifYžX]gWigg]cbždfUWh]VW!VUgYX`UbX`ghiXYbhi`YX``YUfb]b[dfcWyggYg"'H\Y`Z]fgh`UbX``cb[Yf`gYWh]cb`cZh\Y`WcifgY`]g`fY`Uh]jY`mhYUWXYf!`YX`UbX`U`hYfbUhYg`YWhifY#hifcf]U``hYUWX]b[`Zcfa Uhg`k]h\`dfUWh]WU``kcf\_g\cdg"`H\Y`gYWcbX`UbX`g\cfhYf`gYWh]cb`]g`]bhYbXYX`hc\Y`d`ghiXYbhg`ZcghYf`g\_]``g`]b`gY`Z\X]fYWhYX`UbX`[fcid!VUgYX``YUfb]b[`h\fci[\'U'gYf]Yg`cZghiXYbhI`YX

 $fY\YUfgU\gz\W\aa \gbUfgb[\abel{figure} b\UfgU\gz\bfUfg$ 

## 5ggYgga Ybh

5```UggYgga Ybh]bZcfa Uh]cb']g'Uj U]`UV`Y`]b'h\]g'Wci fgY'ci h]bY'UbX`]b'h\Y'UggYgga YbhgYWfjcb']b'A ccX`Y''

5ggYgga YbhhUg_	K Y][\h	8iY'8UHY	7 ci fgY '@YUfb]b[ Ci hWca Yg '5 ggYggYX
%".7\UfUWYf.≢bH/fdfYhUh]cb	%) ।	&, #\$-#&\$&%'%&.\$\$'5A	%ž˙( ž˙)
&"`A Ucf'9ggUm	()	&*#%\$#&\$&%`%&.\$\$`5A	%ž'&ž'' ž')
' "'; fci d'DYfZcfa UbW	(\$1	%+#%#&\$&%`%&.\$\$`DA	%ž'&ž'' ž'( ž')

## $5ggYgga Ybh% 7 \UfUWhYf + bhYfdfYhUh]cb$

5ggYgga Ybh`Yb[ h\. '\*\$\$ k cfXg`fli `W'%) \fg`dfYdUfUh]cb`h]a YŁ Gi Va ]gg]cb`bchYg. 'F YZYf`hc`A ccX`Y" 8i Y`XUhY. '&, #\$-#&\$&%. \$\$:5A

 $\label{eq:continuity} Ghi XYbhg`k]``VY`dfcj]XYX`k]h\`U`fi Vf]W]bX]WUh]b[``YjY``cZdYfZcfa UbWI`U[U]bghYUW``UggYgga Ybh Wf]hYf]U`UbX`dYfWI'bhU[Y`[fUXY"$ 

### 5XX]h]cbU`XYhJ]`g

<sup>\*\$\$!</sup>k cfX`UbU`mg]g"

### 5ggYgga Ybh7f]hYf]U.

K\Yb'a Uf\_]b['mci f'W\* \$\$!k cfX'gi Va ]gg]cbž'mci f'h hcf'k ]``'VY'`cc\_]b['Uhh\Y.

- %" Yj ]XYbWY'h\Uhmci '\Uj Y'fYUX'UVci hGHUb]g`Uj g\_mg']XYUg'fY. []j Yb'WJfW a gHUbWYgž'gi dYfcVYWfj Yž cVYWfj Ygž'i b]hg'UbX'UWfjcbg/
- &" UWW fUWmUbX`UbU`mh]WU``ei U`]hmcZmci f`XYgWf]dh]cb`cZeYV a]Rj id gi dYfcVYWf]j Y`UbX`cZh\Y` TYRcRTeVcd`[]j Yb`WjfW a gHUbWfg`UbX`gi dYfcVYWf] Y`Z\_eYV a]Rj -
- ' " UbU`mhjWU``UbX`]a U[ ]bUhjj Y`ei U`]hmcZmci f`]bhYfdfYhUhjcb`cZh\Y`TYRdRTeVcd`cVYWhj Yg`UbX`UWhjcbg` Z eYV Vi TVcae/
- ("WUf]hmcZmci f`k f]hhYb`Yl dfYgg]cb`fgdY``]b[ž`[fUa a Ufž'gYbhYbWY`ghfi Whi fYž'di bWhi Uh]cbž'k cfX W.c]WYŁ"

: YYXVUW\_. Mci 'k ]``fYWf]j Y`U'Wca d`YhYX'fi Vf]WUbX`U`[ fUXY`j ]U`Hi fb]h]b"'5gg][ ba Ybhg`gi Va ]hhYX`cb`h]a Y k ]``fYWf]j Y`ZYYXVUW\_j JU`Hi fb]h]b`k ]h\]b`&`k YY\_g`cZh\Y`Xi Y`XUhY"'5gg][ ba Ybhg`gi Va ]hhYX``UhY`k ]``fYWf]j Y h\Y`UZcfYa Ybh]cbYX`ZYYXVUW\_k ]h\]b`&`k YY\_g`cZgi Va ]gg]cb"

#### FUNCbUY.

H\Y`a U^cf]hmcZh\Y`dfUWf]r]cbYfg`ghi X]YX`]b`h\]g`Wci fgY`Ug\_YX`UWfcfg`hc`k cf\_`WUfYZ``mk]h\`d`UmhYI hg"``H\]g YI Yf\]gY`[]j Yg`mci `Ub`cddcfhi b]hmhc`Yb[ U[ Y`k]h\`gca Y`cZGhUb]g`Uj g\_mig`]bZi YbhJU``UbX`\_Ym]XYUg`UVci h\ck `UWfcfg`WUb`fYgdcbX`hc`U`d`UmhYI hUbX`gWf]dhYX`W\UfUWhYf"``\\ig\]g`XYg][ bYX`hc`\Y`d`mci `bchcb`mdi h\]g h\Ycf]Yg`]bhc`dfUWf]\W\z\Vi hU`gc`cVgYfj Y`\]g`UddfcUW\`hc`h\Y`fY`UhJcbg`VYhk YYb`UWfcf`UbX`hYI hz`UWfcf`UbX\W\UfUwhYf"

.

### 5ggYgga Ybh& A U^cf 9ggUm

&\$\$\$!&' \$\$"k cfXg""

Gh XYbhgik]``VYidfcj]XYXik]h\'Uifi Vf]W]bX]WUh]b[i`YjY``cZdYfZcfa UbWYiU[U]bghYUWXiUggYgga YbhWf]hYf]U/

@4, ? `UV] def UV\_eh `c\ \\ '\ ac\'gZ fd j \\ R\ \\ Zd \\ Rg\R\_2\\ RS]\\ \`\_? \``U]\\ \/5 \ \_e\\\_e\\ \\ \\ Vd\`fc\T\'dfi

5ggYgga Ybh'7f]hYf]U. Mci k]``VY'UggYggYX'cb.

- %" 7 cbh/bh-imci fiUV]`]mihc`]bWcfdcfUhY`UWWi fUhY`]bZcfa Uhjcb`UbX`WcbWfYhY`YI Ua d`Yg`fY`Yj Ubhihc`mci f WkcgYb`ei Yghjcb`UbX`hc`Xc`gc`k]h\]b`h\Y`[]j Yb`k cfX``]a]h]"Y"`&Z\$\$\$!&Z \$\$`k cfXg`Zcf`a U]b`hYI h YI Wi X]b[`h\Y`ZcchbchYg`UbX`V]V`]c[fUd\m/
- &" Gci fWg'—mci f'UV]`]hmhc'Yb[U[Y'a YUb]b[Z] ``mk]h\'fY`Yj UbhgYhfYUX]b[gžhc'Yl hYbX'mci f'fYUX]b[VYmcbX'h\YgY'gYhhYl hgž'UbX'hc'Ya d`cmh\UhfYgYUfW\'i gYZ] ``m]b'gi ddcfhcZmci f'Uf[i a Ybh/' "

## \hdg.#k k k "`]VfUfm'i bgk "YXi "Ui #gh Xm#gYfj ]WYg!Zcf!gh XYbhg

; Wj`fh`f]U]\LV \WeYVcYV]ah\ZYj`fcdefU\LVdłR\_Uj`fcVddRjd\Z\_aRee\Tf]\Rda]\VRdV\T`\_df]e YV >\VRc\_Z\_X 5\V\_e\Vd d\Vcg\Z\Vd`\_\\hd.#k\k\\"\Wi\bgk\"YXi\"Ui\#

#### ' ": 57 @ H5 HC F G 5B8 GD95? 9F G

? YYdgʻh\Ya YYfjb[gʻUbX`dfYdUfUfjcbʻgYgg]cbgʻa cj ]b[/a U\_Ygʻgi fYʻh\UhfYgYUfW`UWfj]fjYgʻUfYʻYj Yb`m X]gff]Vi fYX`UbX`h\UhYUW\a Ya VYf`]gʻi bXYffU\_]b[ʻfYgYUfW\/Ybgi fYgʻh\UhU``j c]WfgʻUfY`\YUfX`UbX`]XYUg UfY`ff]YX`ci f/\Y`dg`WfYUfY`U`VU`UbWf`VYfk YYbʻfU`\_]b[`UbX`Xc]b["``GdYU\_gʻUhh\Y`Zcfi a `]b`fh\Y`Z]bU``h fcf]U`"

### ("'8F5A5HIF; G'

 $H\ [g'dYfgcb'k] \ ['i'fYUXZ'UbU'mnY'UbX'fYgYUfW\ 'h\ Y'hYI h'VY]b['i'gYXZ'UbX'a U_Y'g][b] \ [i'gYXZ'UbX'a U_Y'g][b] \ [i'gYX'y Uxx'a Uxx'a Uxx'a U_Y'g][b] \ [i'gYX'y Uxx'a Uxx'a Uxx'a U_Y'g][b] \ [i'gYX'y Uxx'a U$ 

### ) "DFC81 7H€B A 5B5; 9FfGŁ

A U\_Ygʻgi fYʻUbmYei ]da YbhždfcdgžWcgh a YgʻYhWʻUfYʻZci bXʻUbXʻfYh fbYXž``]U]gYgʻk ]h\ 7 D@ghUZʻ

#### \*"'C1 HG=89'9M9fGŁ

H\]g`Wci`X`VY`U`X]fYWrcf`Z][ifYžk\caumcfaumbchZYUhfY`UgʻgiW\]b`mcif`dfYgYbhUh]cb"``\\\in\Vci`X`U`gc VY`U`W\cfYc[fUd\Yfž'g#c`k\c`Wci`X`VihbYYX`bchVY`U`XUbWYfž'k\cgY`fc`Y`]g`hc`cVgYfjY`acjYaYbhcf V`cW\_]b[`cf`]bhYfUW]cb`k]h\`h\Y`UiX]YbWY`YhW

#### +"G79BC; F5D<9F

 $H\ [g'][ifY'kci'X'kcf_'WcgY'mk]h\ DUi''A\ Uhh\Ykg'cb'UgdYWhg'cZj']giU''XYg][b'giWX'Ug'igY'cZWcghiaYž'gdUWYZ'gYhZ'UbX'cV'YWhg'YhW''$ 

### , "GCIB85B8 @= <H=B;

 $H\[g'Z][ifY'kci`X'kcf\_cb'gcibX'UbX``][\h]b[`XYg][b'UbX'WcbZYf'k]h\A Uf\_A]hW.Y``cb']ggiYg'giW.`Ug'h.Yd'Ubb]b[`UbX'YIYW'h]cb'cZh.]g'XYg][b'hhfci[\igY'cZUj'hYW.bc`c[]Yg''`$ 

#### GHJZZF Ygci fWYg,

Mci f'hi hcfž'A Y[ ž'UbX'7 D@gHJZ'A Uf\_'UbX'DUi ``UfY'h\YfY'Ug'fYgci fWg'Zcf'UXj ]Wfz'UbX'Ug'gci bX]b[ 'VcUfXg Zcf'mci f']XYUg. h\YmUfY'bchh\YfY'hc'h\YfY'hc'h\]b\_'cf'k\Uhhrc'Xcž'Vi hž'Ug'mci ']XYbhJzmk\Uhmci h\]b\_'UbX'k\Uhmci 'k]g\'hc'Xcž'h\YmUfY'h\YfY'hc'dfcj ]XY'Wcbghfi Wfji Y'Wf]hJWJga 'UbX'\Y`d'mci ']a d`Ya Ybh h\]g"

A Uf\_'UbX'DUi ``k ]``gdYU\_'hc'mci ']b'h\Y'K YY\_') 'gh X]c'WUgg'UVci hh\Y'i gY'cZ7D@fYgci fWrg"

### Gca Y K cfXg cZK ]gXca.

- % mci 'k ]``VY YI dYWYX hc 'Wa a i b]WUhY 'UbX fY\YUfgY k ]h\ 'mci f'[ fci d'a Ya VYfg'cb'U'fY[ i `Uf'VUg]g UbX'c ZhYb'ci hg]XY h\ Y 'gW\YXi `YX 'WUgg'\ci fg"''H\ Y 'Wa fgY \Ug'VYYb'XYg][ bYX'k ]h\ 'h\ ]g'h]a Y Wa a ]ha Ybh]b'a ]bX"'': cf'YI Ua d'Yž'h\ Y'ei Ubh]hmc ZfYUX]b[ g'dYf'k YY\_'\Ug'VYYb'\_Ydh'bc'U a ]b]a i a 'k \YfYj Yf'dcgg]V`Y/U``'WUggYg' Zfca 'K YY\_'+\Uj Y'VYYb'[]j Yb'cj Yf'hc'h\ Y'dYfZcfa UbW'dfc YWYh\ Y'YggUmgi Va ]gg]cb'XUhY'\Ug'VYYb'd'UbbYX'gc'h\ Uhih\ Y'fYgYUfW\ 'Zcf']hk ]``'Wa d'Ya Ybh h\ Y'bUhi fY'UbX'ha ]b[ 'cZh\ Y'dfc YWh'k cf'"
- &" h\]b\_'UVci hYbgYa V`Y`ghfi WhifYg.'k cf\_'ci hk \c']g`Xc]b[ 'k \Uh'Ug`gccb`Ug`mci `WUb"``7 c``UVcfUh]j Y XYW]g]cb!a U\_]b[ 'a Um'VY`dc`]r]WU``mgci bXž'Vi h']b`h\Y`g\cfh'h]a Y`h\Uh'mci `\Uj Yž'k ]h\`gc`a Ubm dYcd`Y`]ha Um'VY`\UfX`hc`a UbU[ Y`YZZYWh]j Y`m''

H\Y'G9DF'Zcfa'k]``]bZcfa'h\Y'a Uf\_'Zcf'h\Y'; fci d'DYfZcfa UbW'f&\$i E']b'h\Y'Zc``ck]b['k Um']Z]hgi [[Yghg h\Uh'U'gh XYbhg']bX]j ]Xi U``Wcbhf]Vi h]cb']g'a cfY'h\Ub') a Uf\_g'UVcj Y'cf'VY`ck'h\Y'cj YfU```[fci d'a Uf\_ž'UbX mci f'h hcf'U[fYYg'h\Uh'h\]g']g'Ub'UVWV fUhY'UggYgga Ybhž'h\Yb'h\Y'[fci d'a Uf\_'K @BCH'VY Uk UfXYX'hc'h\Uh'gh XYbh'''=bghYUXž'Ub'Uj YfU[Y'cZh\Y'gh XYbhg']bX]j ]Xi U``a Uf\_'UbX'h\Y'[fci d'a Uf\_'k]`` VY'YbhYfYX''': cf'Yl Ua d'Y.

; fci d'a Uf,	\$1
±bX]j]Xi U`gh XYbhg'W¢bhf]Vi h]cb,	*
: ]bU``DYfZcfa UbWY`a Uf,	
CF	
; fci d'a Uf,	\$1
±bX]j]XiU`ghXYbhg'W¢bhf]Vihjcb.···+	(
: ]bU`DYfZcfa UbWYa Uf · · · · +	+

 $H\g`UX\f gha\Ybh']g`]bhYbXYX`hc`hU\_Y`UWWcibhcZ]bghUbWYg`k \YfY`Ub`]bX]j\]Xi\ U`'g`Wcbhf]Vi\ h]cb`hc`h\Y`[\ fci\ d'g\ k\ cf\_]g`WYUf`mk\ Y```UVcj\Y`cf`k\Y``VY`ck\`h\Y``Y\Y`Uhk\\W\`h\Y`[\ fci\ d`k\ Ug`k\ cf\_]b[\ `Ug`U`k\c`Y''$ 

YV 7 Wc^ h 2] R]d`YV]a j`fcefe`ce`RddVdd;\_UZgZJfR] 5`\_ecZSfeZ\_e`9c`fa VdWc^R\_TV/dVV SV]`h fž

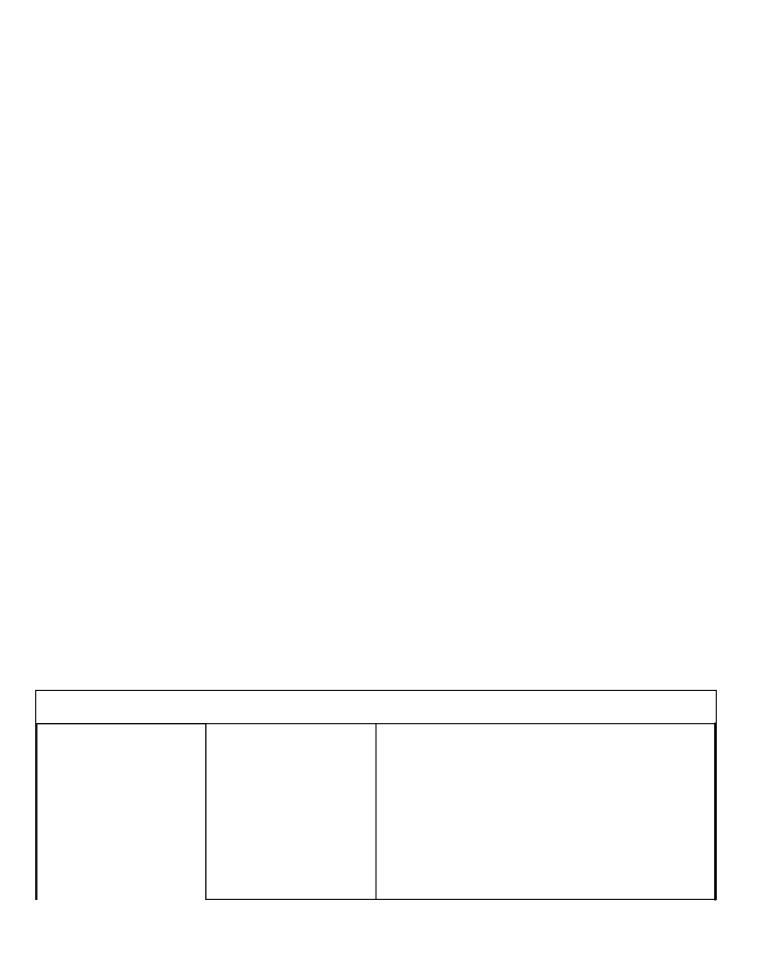
### 5ggYgga YbhcZ = bX]j ]Xi U 7cbff]Vi h]cb f&\$i Ł

H\Y`]bX]j ]Xi U`'g`Wcblf]Vi ljcb`lc`Vch\`dfcW/gg`UbX`dfcXi WicZh\Y`; fci d`DYfZcfa UbW/k]``VY`a Uf\_YX`Vm mci f`li lcf''`K \Yb`U``cWUljb[`th\Y`a Uf\_ž'h\Ymk]``lU\_Y`]blc`Wcbg]XYfUljcb'lh\Y`Zc``ck]b[.

% 'Yj Y`cZUthYbXUbWY'UnW ff]W 'Uf'fK \_g'%|%\$Ł'UbX'YI hfU!W ff]W 'Uf'gYgg]cbg/
&" ei U`]mmcZdUfh]W]dUh]cb'Xi f]b[ 'th\cgY'gYgg]cbg']"Y"'g][ bg'cZUXj UbWY'dfYdUfUh]cbž'j YfVU``UbX d\mg]WU`'dUfh]W]dUh]cbž'UthYbh]j Y``]ghYb]b[ 'UbX'cVgYfj ]b[ žYb[ U[ Ya Ybhk ]h\ 'dYYfg'UbX'h hcf/
' " Wcbhf]Vi h]cb'hc'h\Y'gYh[ fci d'hUg\_g'Zcf'K \_g'+!%\$'UbX'h\Y'Z]bU``dfYgYbhUh]cbž'UbX'Z 'Z]``a YbhcZ [ fci d'fc`Y'fgYY'UVcj YŁ"''Mci f'h hcf'k ]``Wcbgi `hk ]h\ A Uf\_'UbX'DUi ``UbX'k ]```UbU`mY'h\Y'G9DF Zcfa 'k \Yb'Wcbg|XYf]b[ 'th\]g'hmdY'cZ]bX]j [Xi U``Wcbhf]Vi h]cb"

#### FUNCbUY.

 $H\Y'; fci d'DYfZcfa UbWY'U]a g'hc'XYj Y`cd'mci f'i bXYfghUbX]b['cZ\ck'_YmdfUWIjh]cbYfg'k cf_YX'k]h\'UWhcfg cf'dYfZcfa Yfg']b'Ub'YbgYa V`YžUbX'[fci d'k cf_']g'cbY'j U'i UV'Y'a Yh\cX'cZYl d`cf]b['gi W\'k cf_''''\d\bX'XYj Y`cd'h\Y'hmdYg'cZg_]``g'h\Uh'UfY'j ]hU'`k \Yb'k cf_]b[']b'hYUa g ]b'h\Y'k cf_ZcfWYždUfh]W'`Uf'm]b'h\Y'dYfZcfa ]b['Uffg'UbX'h\Y]f']bgh]h h]cbU``WcbhYl hg''$ 



	Gh X]c	K _'%Gh X]c.'; fci d'FYUX]b[ 'cZ'GYhD`UmhYl h
		H]a Y. 'H\i fg" '%* 'GYdhYa VYfž'-!%*Ua 'C F ''!) da
		9ggYbhJU`FYUXJb[
		D`UmhYI h`'5bXfYk '6cj Y``ž'H YV_eYV RZ_e`ad 8R]]Z_X`f@cbXcb.'B]W_' <yfbž&\$\$-łž'8fua td="" u'cb`]by<=""></yfbž&\$\$-łž'8fua>
K YY_'&.'&\$'GYdhYa VYf !'&('GYdhYa VYf	@YWhi fY	K_`&`@YWhifY#Hihcf]U`.`Hcd]W`GhUb]g`Ujg_m! DgmW\c`c[]WU`FYU`]ga:/`h\Y`7YbhfU`]nUh]cb`cZ 7\UfUWhYf
		H]a Y. K YX && GYdhYa VYfž %&! &da
		#5 k \Uhk Umg k Ug G HUb]g Uj g_mig Uddfc UW. hc UWn]b[ ]bZi YbW X Vm UhY b]bYhYYbh\!W bh fm ZcfW g cZa cXYfb]nUh]cb ]b 9 i fcdYž]bWi X]b[ 'bYk gW]YbW g' gi W Ug dcg]hj ]ga UbX dgmW cUbU mg]g3 < ck 'XcYg \]g k cf_fY UhY hc Vch\ F ca Ubh]W]ga 'UbX B Uh fU ]ga 3 \dot b k \Uhk Umg k Ug \]g k cf_i bXYfd]bbYX Vmb]bYhYbh\!W bh fm ]VYfU \ia Ub]gh]XYc c[ m8 K \Uhk Ug h\Y bUh fY cZ\]g j ]g]cb cZh\Y dgmW Y UbX cZ'bUh fY'3 \dot 5bX ]b k \Uhk Umg k YfY \]g 'VY ]YZg 'UbX k cf Xj ]Yk g fYZYWYX ]b \]g 'UddfcUW hc h\Y 'UbU mg]g 'UbX Vi ]X]b[ 'cZU gWf]dhYX 'W UfUWnYf3'
		9ggYbh]U`FYUX]b[.
		%L```G\Ufcb`A Uf]Y`7 Ufb]W_Yž'GHUb]g`Uj g_mg GmghYa .`DUh\k Umg`Zcf`H\Y`UWcf'ž]b`5`]gcb` <cx[y fYX"L` hV_eVeY5V_efg`3Te`c cRZ_Z_X`fl@cbXcb UbX`BYk`Mcf`Fci hYX[Yž&amp;\$\$\$LZ'dd"`%% `*/</cx[y 
		&Ł```7 cbgłUbłjb'GłUb]g`Uj g_]ž'I b]lg'UbX CVYWlj Yg'ž3_3Te'c d'aRd'dł lfUbg"'9`]nUVYl\ FYmbc`Xg' <ud[ccx'fbyk'mcf'h\yulfy'5fh 6cc_gž'%(, Łž'dd"'%\$)!%%"</ud[ccx'fbyk'mcf'h\yulfy'5fh 
		Cdh]cbU`FYUX]b[.
		%"G\Ufcb'AUf]Y'7Ufb]W_Yž'%\$'5Wf]cb'UbX'h\Y \iaUb'VcXm']b'h\Y'fc'Y'ž']b'eR_Zd]Rgd\jZ_ 8`Tfd,3_3TeZ_X?RdeVcWceYVhV_ejŽ WZde5V_efg'ž&bX'YX"'f@cbXcb'UbX'BYk Mcf_'FcihYX[Yž&\$\$-Łždd"'%)!&\$*ž &''!'("
	Gh X]c	K_`&`Ghi X]c.`Hcd]W`GhUb]g`Ujg_mKcf_g\cd. 7fYUh]b[`h\Y`GhUhY`cZ`5g`-Z

	H]a Y. H\i fg & GYdhYa VYfz - ! %Ua CF ' !) da  Rœ7 _V. F Y`UI Uh]cb 'UbX' (Yhr]b[ ']bhc 'h\Y'f][ \h ZfUa Y`cZa ]bX'/k cf_cb'; ]j Yb'7 ]fW a ghUbWrgž

		4 cVTYeZ_ cRTeZTV, YVRecVł YV`g R_U VcWc^R_TV'f@cbXcb.'6`cca gVi fmž &\$%) łż'dd"'%\$-!') ž&&)!+" &"A Y[ 'A i a ZcfXž'6fYWklg'? YmH\Ycf]Yg'ž']b' 4 Vce`]e4 cVTYef@cbXcb'UbX'BYk' Mcf F ci hYX[ Yž'&\$\$-łž'dd"'(,!-\$"  DG. 'H\Y'7\UfUWHYf'+bHYfdfYhUh]cb'Ugg][ ba Ybh k Ug'Xi Y'mYghYfXUmž'Hi YgXUm&, 'GYdhYa VYfž'hc Hi fb]h]b'VYZcfY'a ]Xb][\h''
	Gh X]c	K_" Ghi X]c. Hcd]W! 6fYWhK cf_g\cd. 7fYUh]b[ 8YZUa ]`]Uf]n]b[ / Cddcg]h]cbU` 5ffUb[ Ya Ybhg
		H]a Y. H\i fgXUm' \$'GYdhYa VYfž'-!%Ua 'C F '!) da
		R@7_V.`7ca dcfha Ybh'UbX`g]hi Uhjcb`gWYbUf]cg/ WfYUhjb[`J!YZYWfg/g\ck]b[`gcWjU``WjfW'a ghUbWYg/ ZfUa]b[`W'ghcag"
		Rœ h`.'FY\YUfg]b['U'6fYW\n'hYI n'-' 3 ccR_XV^V_ecZh\Y'fUdY'hf]U`'g\W'bY'fg\W'bY') Ł Zfca '6fYW\hg' YV 5 Rf TRdZR_ 5 YR]\ 5 ZcT]V
		9ggYbh]U`FYUX]b[.
		%"G\ca]hA]hYfž'&"HC 69 5B8 BCH"HC 69. 6Yfhch6fYW\hUbX"DYhYf6fcc_'z"]b" j deV^d`W VYVRcdR], eR_Zd]Rgd\j l 4cVTYel9cehd\ZR_U4c`\\f@cbXcb"UbX BYk Mcf"Fci hYX[Yz'%-&tz'dd""(&!++"
K YY_'(.'('CWcVYf'!', CWcVYf	@YWhi fY	K_'('@YWhifY#Hihcf]U`.'Hcd]W 'HUXUg\] Gini_].'5'7fcgg!7i`hifU`FYX]gWcjYfmcZh\Y 6cXmg'DchYbh]U`
		H]a Y. K YX" * C WcVYfž %! &da
		K \Uhk YfY h\Y WcbhYl hi U``U`W``hi fU``fYUgcbg`h\Uh YX`Gi ni _]'hc`fY YWhK YghYfb`fYU`]ga `]b`ZJj ci f`cZ YI hfU!cfX]bUfmUb]a U``YbYf[ m8'`K \Uh\UddYbg`hc `]hYfUfmhYl hUbX`W\UfUWYf`]b`h\Y`Gi ni _]`a Yh\cX`cZ UWf]b[ 3`< ck `UbX`hc`k \UhYbX`XcYg`h\Y`dYfZcfa Yf Yb[ U[ Y`k ]h\`dgmW\c!d\mg]\W``j i `bYfUV]`]mh\fci [\U'j ]fhi cg]\W\cbhfc``cZh\Y`VcXm8``+b`k \Uhk Umg`X]X Gi ni _]`XfUk `Zfca 'h\Y`>UdUbYgY`hfUX]h]cbg`cZBc\ UbX`? UVi _]`dYfZcfa Ub\W3``< ck `XcYg`\Y`Vf]b[ `c`X UbX`bYk ž'9UghUbX`K Yghhc[Yh\Yf3`5bX`k\Uh]g h\Y`]XYc`c[ ]\W\`j ]g]cb`cZk fYh\XYXbYggž ]a dYfa UbYb\W*zghfi [ [ `Y`UbX`i b]ei Y`X]ZYfYb\W

	h\uh]bZcfa g`\]g`a Yh\cXg`UbX`[cU`g3`  DYfZcfa ]b[ `cb`]bY`GYgg]cb`& `H\Y``YWi fY`g`ch k ]``WcbWi XY`k ]h\`U'`\$!a ]b`YI d`cfUh]cb`cZ ghfUhY[]Yg`UbX`hYW\b]WU`_bck `YX[Yg`Zcf dYfZcfa ]b[ `cb`]bY"  9ggYbh]U``F YUX]b[ .  %L``DUi ``5``U]bžʻ±bhfcXi W]b[ `Gi ni _]'ž`]b` YV 3œ` We]_Vdd, YV YVRev cRTeIV` W RURdYZ fkf\Z f@cbXcb.`A Yh\i Ybž`&\$\$&Łž'dd"'%I' ("''  &L`HUXUg\]`Gi ni _]ž'H\Y'; fUa a Uf`cZh\Y': YYhž

		HcZeZ_Xd`W RURdYZ fkf\ZfBYk "Mcf"H\YUHfY 7 caaib]WUh]cbg'; fcidž%, *Łz']b'; 'Ybb'C Xcaz' H`c]U YV`cZVd`W YVRecV'f@cbXcb'UbX'BYk Mcf"FcihYX[Yz'&\$%+Łz'dd"'%*)!%+)"''
K YY_').'%%'C WhcVYf'! %)'C WhcVYf	@YWhi fY	K_') '@YWhifY#Hifcf]U`. 'Hcd]W ': cfWYX 9bhYfhU]ba Ybh'UbX'7\U``Yb[Yg'fc'7\UfUWhYf! UbX'HYIH6UgYX'5Wh]b[
		H]a Y. K YX" % C WcVYfž %! &da
		K \mX]X a UbmdfUWjhjcbYfg cZh\Y ``UhY hk YbhjYh\ Wbhi fmž`]_Y h\Y 6fjhjg\ Wa dUbm: cfWX 9bhYfhUjba Ybhfl%, ('!\EZVYWa Y X]g[ fi bhYX k ]h\ hYl hVUgYX h\YUhfY UbX UWjb[ 3`K \mX]X h\Ymh fb hc ch\Yf Zcfa g cZdYfZcfa ]b[ h\UhA ]W\UY`?]fVm ci h]bYg ]b`\]g UWjb[ hc bchUWjb[ gdYWfi a 3` K \UhUfY h\Y]XYc`c[ ]WU``]a d`]WUhcbg cZh\Y Wa dUbmg gc!WU``YX 'VUX UWjb[ '3`
		DYfZcfa ]b[ 'cb`]bY'GYgg]cb" . 'H\Y'`YWfi fY'g`chk]``'WcbWi XY'k]h\'U" \$!a]b'Yld`cfUh]cb'cZghfUhY[]Yg'UbX'hYW\b]WU`'_bck`YX[Yg'ZcfdYfZcfa]b[ 'cb`]bY"
		9ggYbh]U`FYUX]b[.
		%"GUfU'>UbY'6U]'Ygž'Gffi [[']b['fc'DYfZcfa. FUX]WU'5a UfYi f]ga 'UbX': cfWYX 9bfYffU]ba Ybffz YVRecV8` cf ^ z'&* fl&\$\$) Ł ) *!*) "'' &"A ]WXUY'?]fVmž'C b 5WfJb[ 'UbX'B cft5WfJb['ž ]b'; fY[cfm6UfWcW_'UbX'FcVYfhB]W_Ug ffYXg"Łz YV 3œ` W VcWc^ R_TV fBYk 'Mcf 8 U'fcbz'%, (Łz'dd"'-+!%%+/ ' "D\]']d'5i g`UbXYfz'"'>i ghVY'mci f'gY'Z'' >` X`TV_ecZd^ 'UbX'UZWWcR_TV']b dYfZcfa UbW'fhYcfmz']b'8c` ^ 3TeZ_X e` VcWc^ R_TV, 7ddRj d Z_?`UVc_Zd^ R_U `de^` UVc_Zd^ 'fecbXcb'UbX'BYk 'Mcf F ci hYX[Yz'%-+Łz'dd"'%+)!, %"
	Gh X]c	K') 'Gh X]c. 'Hcd]W ': cfWYX'9bhYfhJ]ba Ybh UbX'D`Um]b[ 'k ]h\ 'h\ Y'F Yei ]fYa Ybh'hc 'DYfZcfa  H]a Y. 'H\i fg"'%( 'C WcVYfz-!%Ja 'C F ''!) da
		H\]g'cbY!\ci f'k cf_g\cd'k ]``'ffmci hcb'h\Y'Zccf h\Y'k UmdfUWjhjcbYfgž']bWi X]b[': cfWX 9bHYffU]ba Ybhž\Uj Y'W\U``Yb[YX'Wca d`YI''UWfjb[ h\fci [\'YI dYf]a Ybhjb['k]h\'UddfcUW\Yg'gi W\'Ug g]a d`Y'UWfjb[žVUX'UWfjb[žgY`ZlfYdfYgYbhUhjcb'UbX

		bcb!a Ulf]I YX fYdfYgYblUljcb"  *b'h\Y'gYWcbX'\ci f'cZh\]g'WUgg'mci 'k ]``'k cf_']b U``cWUlYX'dYfZcfa UbW'[fci dg'''Mci 'k ]``'ZbU']nY [fci d'fc'Yg'UbX'XfUk 'i d'&'Yl lfU!W'ff]W'`Uf a YYljb[g'VYlk YYb'bck 'UbX'h\Y'K YY_'+ K YXbYgXUmg'ch'''H\cgY'&'a YYljb[g'a i gh'UlfYbX lc'h\Y'K YY_'+'lUg_'fgYY'VY'ck \t''''  5hih\Y'YbX'cZh\Y'k cf_g\cd'h\YfY'k ]``VY'U'j ]g]h Zfca '7 D@'ghUZz'DUi ``A Ulf\Yk g'UbX'A Uf_'A ]hW\Y'`z lc'X]gW'gg'h\Y'; fci d'DYfZcfa UbW'''H\]g']g'U'gc k\Yb'h\Y'dYfZcfa UbW''[fci dg'k]``VY'Zcfa YXz'UbX U'F Y\YUfgU``GW\YXi 'Y'k ]h\'fcca 'Vcc_]b[g'UbX ]bZcfa Uljcb'UVci hglUZzj ]g]hilja Yg'k ]``VY X]glf]Vi hYX''''  DG. 'GY'Z XYj ]gYX'YggUmlcd]Wg'UfY'Xi Y'Vm Ya U]``lc'mci f'h lcf'lcXUm''Mci f'YggUm]g'Xi Y lc''Hi fb]h]b'VYZcfY'a ]Xb][\hcb'Hi YgXUm&* C WrcVYf'fK YY_'+\t''
K YY_'*.'% 'C WcVYf'! &&'C WcVYf	5ggYgga Ybh	K _ '* '! ': 'YI 'K YY_"

	±oʻh\]gʻK YXbYgXUmʻgʻchmci fʻ[fci dʻfcʻYgʻUbXž]Z fYʻYj Ubhžmci fʻWUgh]b[ʻg\ci `XʻVYʻZ]bUʻ]nYX"ʻMci a i ghʻUʻgcʻdfYgYbhʻ[fci dʻk cf_ʻcbʻh\YʻZcʻ`ck ]b[

	Gh X]c	' "Ci h]bY HYW\b]\W\"F Yei ]fYa Ybhg."][\h]b[ ž gci bXžUj fdfc Y\M]cbžhj žg`]XYgŁf\W"\% '5( I " 'dU[ YŁ"  B6. '8]ghf]Vi h]cb cZh\Y'GY`Z 9j U`i Uh]cb UbX DYYf F Yj ]Yk 'fG9DF ŁZcfa ""  K', 'Ghi X]c.'; fci d'DYfZcfa Ub\W' 'FY\YUfgU` (  H]a Y. 'H\i fg" ( 'Bcj Ya VYfž-!\%\Ja 'CF''!) da  H\Y'[ fci d'g\ci `X'Z fh\Yf'XYj Y`cd'h\Y]f']XYUg UVci hh\Y'gYei Yb\W' cZYj Ybhg'UbX'h\Y'XYg][ b	
		WebWYdh]b``][\hcZZYYXVUW_`Zfca `gHJZZ`FYgYUfW\fc`Yg`UbX`UWf]j]h]Yg`Zcf`h\Y`K'- `HJg_`g\ci `X`VY U``cWUhYXž`UbX`k cf_`cb`h\Uh'HJg_`VY`Wca a YbWYX"`	
K YY_'', 'Bcj Ya VYf'! '&'Bcj Ya VYf	Gh X]c	K _'- 'Ghi X]c.'; fci d'DYfZcfa UbWY' 'F Y\YUfgl )	
		H]a Y. K YX"'%\$Bcj Ya VYfž'‱!&da	
		DfYgYbh'Mci f'6'cW_]b['K U'_!H\fci [\.	
		GHJ[Y'U'Z]fghk U`_!h\fci [\'cZh\Y'dYfZcfa UbW'f]hg gYei YbWgž'UffUb[Ya Ybhg'UbX'YZYWgŁk]h\'ghJZ fhci f'h hcfz'A Uf_'UbX'DUi `Ł'Ug gdYWfUhcfg#Jgg]ghJbhg"''H\Y'[fci d'g\ci `X'UhhYbX U'gc'hc'h\Y'j]Yk]b['dcg]h]cbfgŁ'cZh\Y'Ui X]YbW UbX'UbmUi X]YbW	

	H]a Y. H\i fg"% Bcj Ya VYfž-!‰Ua CF"!) da ZUbmdYfZcfa UbWg'Wti X'bchVY'dYfZcfa YXžcf
	dfcdYf`mdfYgYbhYX`UhmYghYfXUm'g`dfYgYbhUh]cb Yj YbhXi Y`hc`i bZcfYgYYb`W]fW a ghUbWYgž`U``]j Y cb`]bY`dfYgYbhUh]cb`k]```hU_Y`d`UWY`Uhih\Y

## 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'y JUbhXcW a Ybhg\mathred{Image: Wa Jhmci f'Hy\Mybg'\mathred{Image: Whybg\mathred{Image: Wa U]''9! hYfbU''Gi ddcfhmci 'k ]'`
Ui hca Uh\W\mathred{Image: Wa Jhmci h\Yf\mathred{Image: Wa Jhmci 'k ]\mathred{Image: Wa U]''9! hYfbU''Gi ddcfhmci 'k ]'`
Ui hca Uh\W\mathred{Image: Wa Jhmci h\Yf\mathred{Image: Wa Jh\Mathred{Image: Wa U]''9! hYfbU''Gi ddcfhmci 'k ]'`
Ui hca Uh\W\mathred{Image: Wa Jhmci 'h\Yf\mathred{Image: Wa Jhmci 'k ]\mathred{Image: Wa Jhmci 'k ]\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=iWUbihU\_Yia Ubm Zcfa gžZfca iXYi]VYfUhYiWXYUh]b[ihciUWW]XYbhU`mWcdm]b[iZfca iUigci fWYik]h\ci hiUW\_bck iYX[Ya Ybh'i

## 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/
- fYi ]Yk 'cZa Uf g/
- I BGK '< YU`h\ 'UbX'GUZYhm'dc`]W[Yg/
- YI Ua ]bUhcb dfcWXi fYg/
- gdYWJU``Wcbg]XYfUhJcb']b'h\Y'Yj YbhcZ]``bYgg'cf'a ]gUXj Ybh fY/
- gh XYbhYei ]mrUbX X]gUV]`]m/
- UbX'ch\Yf'YggYbhJU''UWUXYa ]W]bZcfa UhJcbž'gYY

\hdg.#k k k "Uffg"i bgk "YXi "Ui #W ffYbhgh XYbhg#UWUXYa ]W]bZcfa Uhcb#dfchcWc`g![i ]XY`]bYg#

.

### a U[Y'7fYX]h

H\YUlfY UbX DYfZcfa UbW Gh X]YgžI BGK

### 7F = 7CG

7 F = 7 C G 'Dfc| ]XYf'7 cXY. '\$\$\$-,;