

# **EDST5150**

HYUWXYf'@Ub[i U[Y'5k UfYbYgg

GYa YghYf'Hk c''#'&\$%

# 7ci fgY Cj Yfj ]Yk

### GHJZZ7cbHJWh8YHJ]`g

#### 7cbj Ybcfg

B Ua Y	9a U]`	5j U]`UV]`]lm	@cWUh]cb	D\cbY
5bXm; Uc	l i Ygcb["[Uc4 i bgk "YXi "Ui	&!(da K YXbYgXUmg	%%(; ccXgY`` 6i]`X]b[	-',)'+&*

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

GW.cc`cZ9Xi WUHcb 5fhg'UbX'GcWJU`GWJYbWYg

@Yj Y``%ž'>c\b'; ccXgY```6i ]`X]b[ 'fl &\$Ł

H. 'Ž \* %'f&Ł'-',) '%-++

9. YXi WUhjcb4 i bgk "YXi "Ui

K. YXi WUhjcb"Ufhg"i bgk "YXi "Ui

#### 5 h Y b X U b W F Y e i ] f Y a Y b h g

#### 5XX]h]cbU``GW\cc``cZ'9Xi WUh]cb'UhYbXUbWY'fYei ]fYa Ybhq

#i]gYI dYWYX ih UhUbmghi XYbhiYbfc``YX`]b`Ub`98GH`Wci fgY`k ]h\ ih\Y`GW\cc``cZ9Xi WUhjcb`k ]```a U\_Y`U Wca a ]ha Ybhhc ih\Y]f``YUfb]b[ 'UbX`UhhYbX`U```WUggYg`]b`Z ```k \YfY`WcbhYbh]g`XY`]j YfYX`]b`U`ZJ\W!hc!ZJ\W a cXY`YI Widh]b`WjfW a ghUbWyg`k \YfY`UVgYbW']g`Xi Y`hc`]``bYggža ]gUXj Ybhi fY`cf`i bZcfYgYYb WjfW a ghUbWyg`VYmcbX`h\Y`ghi XYbhg`Wcbhfc`"``5`a ]b]a i a 'UhhYbXUbW'fYei ]fYa YbhcZ, \$i ']g`fYei ]fYX`Zcf YUW\ wci fgY"``\#o`WffU]b`WjfW a ghUbWygžU`ghi XYbha Uma ]gg`i d`hc`&\$i 'cZU`Wci fgY`k ]h\ci hZcfa U` Udd`]\WUhjcb`UbX`i d`hc`'' i 'cZU`Wci fgY`k ]h\`Zcfa U``XcW a YbhUhjcb`fgYbhj ]U`Ya Uj`hc`Wci fgY`Wcbj YbcfL dfcj ]X]b[ 'U``h\Y`fYei ]fYa Ybhg`XYhU]YX`VY`ck 'UfY`a Yh'``Ghi XYbhg`bcha YYhjb[ 'h\Y`UhhYbXUbW\ fYei ]fYa Ybhg`ci h]bYX`UVcj Y`k ]```VY`Uk UfXYX`Ub`I bgUhjgZJ\Wcfm: U]``fI : ŁZcf`h\Uh\Wci fgY`fY[ UfX`Ygg`cZ h\Y]f`dYfZcfa Ub\W']b`h\Y`UggYgga YbhhUg\_g`cf`ch\Yf`fYei ]fYa Ybhg`Zcf`h\Y`Wci fgY"

: cfiZ fh\Yfi]bZcfa Uhjcbicbi9Xi WUhjcbiWci fgYiUhhYbXUbWYifYei ]fYa YbhgžidiYUgYifYZYfihcih\YifYgdYWhji Y 98GHiA ccXiYia cXi `Yfgt"

Wf\$%0

#### 5 WUXYa 1W = b Zcfa Uhlcb

: cfY ghi XYbh% Yg **%** Yb

## 7ci fgY 8YW] g

7 fYX]h'Dc]bhg'\*

K cf\_`cUX

%) \$`\ci fg`]bWi X]b[`WUgg`WcbHUWh\ci fgž`fYUX]b[gž`WUgg`dfYdUfUh]cbž`UggYgga Ybhž`Zc``ck`i d`UWhjj]h]Ygž YhW

### Giaa UfmcZh\Y 7ci fgY

 $\pm 0.5 \text{ hh} \ ] g'Wci fgYz'mci 'k ] \ 'i dXUHY'UbX'XYYdYb'mci f'g\_] \ 'g'Ug'U'`Ub[i U[Y'UbX'`]HYfUWmHYUWXYf']b' hXY'Zc'`ck ] b[UfYUg. 'hXY'bUhi fY'cZ'`Ub[i U[Y'Ug'U'd\Ybca Ybcb/`Ub[i U[Y'Zcfa z'a YUb]b['UbX'i gY/`Ub[i U[Y'UbU'mg]g'UhgYbHYbHJU`'Yj Y`gz'cfUWmUbX'`]HYfUWmUbX'X]ZZYfYbW'g'UbX'g]a ] \ 'Uf]h]Yg'VYlk YYb'gdc_YbUbX'k f]hHYb'Zcfa g'cZ'Ub[i U[Y/Z]fghUbX'gYWcbX'`Ub[i U[Y'UWei]g]h]cb'UbX']a d`]WUh]cbg'Zcf'HYUWX]b[/Ubcj Yf] ] Yk 'cZhXY'gHfi Whi fU''[fUa a Uf'cZ9b[']g\z'ZcWig]b['cb'hX''j YfV'd\fUgY'fhYbgY'UbX'UgdYWhz'a cXU']hmz'UbX'Wc\Yg]cb/gW\c'Ufg\]d'cZhYUWXYf'`Ub[i U[Y'Uk UfYbYgg''$ 

#### 5 hith Y WcbWi g]cb cZhh]g Wci fgY hh Y ghi XYbhik]``VY UV Y hc

- %" ⇒ YbhjZnž: XYgWf]VY: UbX: Wf]hjei Y:h\Y:df]bWjd`Yg: UbX:]ggi Yg:]a dUWf]b[:Z]fghUbX:gYWcbX:`Ub[i U[Y YUfb]b[:UbX:]a d`]WUhjcbg: Zcf:hYUW.]b["
- &" 9| d`U]b'h\Y'bUhi fY'cZgdc\_Yb'UbX'k f]hhYb'`Ub[i U[Y"
- ' " 5 bU`mgY`UbX`X]gWigg`ghfi WhifU``Wcbg]XYfUh]cbg`]b`h\Y`9b[`]g\``Ub[i U[Y"
- ("9jUiUhY'UbX'Wf]hjeiY'WbhYa dcfUfmfYgYUfWX'cb'hYUWXYf'`Ub[iU[Y'Uk UfYbYgg"

## HYUW ]b[ 'GhfUhY[ ]Yg'

HYUWX]b[ 'ghfUhY[]Yg

 $\label{thm:continuous} $$ Gh XYbhg``YUfb`VYghk Yb'hYmUfY`Yb[U[YX`UbX`[]jYb'Ub'Uddfcdf]UhY``YjY``cZWkU``Yb[Y/k Yb'hXY]fdf]cf`YldYf]YbWY`UbX`_bck``YX[Y`]g'jU`iYX`UbX`Vi]`hidcb/k Yb'hXYmUfY`YldYWhYX`hc'hU_Y`fYgdcbg]V]`]hm Zcf'hXY]f'ckb``YUfb]b[/UbX`k Yb'hXYmk cf_'Wc``UVcfUhjjY`mk]h\'hXY]f'dYYfg'' H\igž'hYUW\]b['ghfUhY[]Yg'igYX`Xif]b['hXY'WcifgY'k]``]bWiXY.$ 

- K YY\_`mZJWY hc ZJWY WcbhJWhgYgg]cbg
- Ga U```[fci d'WccdYfUh]j Y ``YUfb]b['hc'UXXfYgg'hYUWX]b[ ``YUfb]b['[cU`g/
- Glfi Wi fYg'c\w\ug]cbg'Zcf'gh XYbhg'hc'fYZY\\n\v\f]h]\\\\"mcb'\ubX']a dfcj Y'h\u\\\]b['df\u\\n\]\\\/
- D`YbUfmX]gW gg]cbg Ufci bX WcfY ]ggi Yg UbX XYVUhYg/
- 91 hYbg]j Y`cddcfhi b]hjYg`Zcf`k \c`Y`[fci d`UbX`ga U```[fci d`X]U`c[i Y`UbX`X]gW gg]cb"`U``ck ]b[ghi XYbhg`h\Y`cddcfhi b]hmhc`XYa cbghfUhY`h\Y]f`WbdUW]hmhc`Wca a i b]\WbY`UbX``]U]gY`k ]h\`h\Y`X]j YfgYa Ya VYfg`cZUb`YXi Wbhjcb`Wca a i b]hmž`UbX`hc`XYa cbghfUhY`h\Y]f`\_bck`YX[Y`UbX`i bXYfghJbX]b[`cZ WcbhYbh/
- Cb`]bY``YUfb]b['Zfca 'fYei]fYX'UbX'fYWca a YbXYX'fYUX]b[g

H\YgY`UWfjj ]fjYg`k]```cVWVf`]b`U`WUggfcca `W]a UfY`f\Uh]g`gi ddcffjb[ `UbX`]bWi g]j Y`cZU```YUfbYfg"

#### F UhlcbU`Y

 $\label{thm:converse} H\Y'WcbhYbhcZh\Y'Wci fgY'dfcj ]XYg'Ub'cj Yfj ]Yk 'cZh\Y'a U'cf'fYgYUfW\'UbX'dfUWf)WU``]ggi Yg'fY`Yj Ubhhc hYUW\Yf``Ub[i U[Y'Uk UfYbYgg"''H\]g'Wci fgY']bhfcXi WYg'gh XYbhg'hc'h\Y']ggi Yg'UbX'hcd]Wg'`]ghYX'UVcj Y'Zcf h\Y'di fdcgYg'cZgYWcbX'`Ub[i U[Y'hYUW\]b[']b'U'j Uf]YhmcZgYhf]b[g"''H\Y'hYUW\]b['UddfcUW\'k]``'UWf]Y`m Yb[U[Y'gh XYbhg'Ug'h\YmX]gW gg'h\YgY']ggi Yg'UbX'Udd`mh\Ya 'hc'hYUW\]b['WcbhYI hg'k]h\'k \]W\'h\YmUfY ZJa ]`]Uf"$ 

# 5i ghfu`]Ub'DfcZYgg]cbU`; fUXi UhY'HYUWX]b['GhJbXUfXg

GHUbXUfX	8YgWf]dh]cb
%"%"&	I gY`hYUWX]b[`ghfUhY[]Yg`VUgYX`cb`_bck`YX[Y`cZghi XYbhgfid\mg]WU`ž'gcW]U``UbX

## 5ggYgga Ybh

## 5ggYgga Ybh'HUg\_g'

5ggYgga Ybh'hUg_	K Y][ \h	Gh XYbh@YUfb]b[ Ci hWca Yg 5ggYggYX	5 +HG@'DfcZYgg]cbU`; fUXi UHY HYUWX]b[ 'GHJbXUfXg'5ggYggYX	8iY 8UhY
@hYfUh fY`fYj]Yk`	(\$1	&ž(	%"%"&ž%"&"' ž%"' "&	&- #\$, #& \$% \$).\$\$ DA
7 UgY 'ghi XmcZUb 9b[ `]g\ ``Ub[ i U[ Y 'YUfbYf'	*\$1	%ž&Ž Ž(	%"%"&ž%"&"' ž%"' "&	\$%#%#& \$% \$).\$\$ DA

D`YUgY`fYZYf`hc`3gefc\$/[S`BdaXWee[a`S^EfS`VSdVeXadFW\$UZWde`cb`h\Y`dfYj]cig`dU[Y

## 5ggYgga Ybh'8YhJ]`g

5ggYgga Ybh% @]hYfUh fY fYj ]Yk

#### GHJfh:XUhY.

8 YHJ]`g. '7 cbXi WhiUbX`XcW a YbhiUb`]b!XYdh\ fYj ]Yk 'cZh\Y``]hYfUhi fY`cb`h\Y`bUhi fY`cZ`YUfbYf``Ub[i U[Y`UbX`gYWcbX``Ub[i U[Y`UWei]g]h]cb"&) \$\$`k cfXg"Ghi XYbhg`k]```fYWY]j Y`ZYYXVUW\_k ]h\]b`%\$`Vi g]bYgg`XUmg`cZ gi Va ]gg]cb"

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

 $\label{thm:conditional} $$H\g^Ugg][ba\YbhUg\_g^mci^hc^kf]hY^U^WcbW]gY\check{z}]bZcfa\YX^UbX^Wf]h]WU^*]hYfUh^ffY^fYj^JYk^]b^k^]w^k^mci^k]^*$$ 

XYj Y`cd`mci f`UbU`mł]WJ``UbX`fYgYUfW.`g\_]``g`Ug`k Y```Ug`U`a i W.`XYYdYf`i bXYfgłUbX]b[ `cZU`dUfł]W``Uf UgdYWficZh\Y`bUhi fY`cZ`YUfbYf``Ub[ i U[ Y`UbX`gYWcbX``Ub[ i U[ Y`UWei ]g]h]cb`h\Ub`]g`dcgg]V`Y`]b`WUgg"``H\Y fYj ]Yk `Wcbg]ghg`cZU`WcbW]gYž`]bZcfa YX`UbX`Wf]h]WJ``fYdcfhicZh\Y`fYgi `hgžVUgYX`cb`Yl ]gh]b[ `G@5`fYgYUfW.ž cZmci f`]bj Ygh][ Uh]cb`]bhc`U'dUfh]W``Uf`]ggi Y`cf`ei Ygh]cb`]b`gYWcbX``Ub[ i U[ Y``YUfb]b[ `k \]W\`UZY\Wg`h\Y YXi WUh]cb`cZghi XYbhg`Zcf`k \ca '9b[ `]g\`]g`U'gYWcbX`cf`UXX]h]cbU```Ub[ i U[ Y"'9l Ua d`Yg`cZdchYbh]U``]ggi Yg ]bWi XY.

- K \Uh]g`h\Y`VYghU[Y`Zcf`gW\cc`]b[`]b`9b[`]g\``Ub[i U[Y`hc`Wca a YbW\'Zcf`gh XYbhg``YUfb]b[`]b`UbX h\fci [\`9b[`]g\`Ug`U`gYWcbX`cf`UXX]h]cbU```Ub[i U[Y3`
- =g`]bhYfUWgcb`k]h\`'bUnjj Y'`gdYU\_Yfg`bYWggUfm'Zcf`YZZYWnjj Y`9b[`]g\``Ub[i U[Y``YUfb]b[3
- $\bullet < \mathsf{ck'aiWW} \ \mathsf{ZcW} \ \mathsf{g'cb'Zcfa'} \ \mathsf{g'bYW} \ \mathsf{ggUfm'Zcf'YZZYW} \ \mathsf{j'Y'9b[']g\ ``Ub[iU[Y''YUfb]b[3]''}$
- Hc'k\Uh'YI hYbh']g'dYYf']bhYfUW]cb#[fci dk cf\_'bYWYggUfm'Zcf'gYWcbX'`Ub[i U[Y'UWei]g]h]cb3
- < ck 'WUb'k Y']a dfcj Y'gh XYbha chj Uhjcb'Zcf'9b[`]g\ ``Ub[i U[Y ``YUfb]b[3
- K \Uhg\ci`X'VY'h\Y'dc`]\\micb'\\cXY!gk]\\mi\]b['cf'\tf\Ubg`\Ub[i U[]\b[']\b'\h\Y'9b[`]g\!a YX]i a \\\mathrea{\text{WUggfcca}} 3
- < ck 'WUb'U'HYUWXYf'UX^ ghi\]g'cf'\Yf'ZYYXVUW\_'hc'Yb\UbWY'9b[`]g\``Ub[i U[Y``YUfb]b[3

•

• K \Uh'UfY'h\Y'a U]b'gcW]U`'UbX'W'`h fU`'ZUWcfg'k\]W\'ZUW]']HUhY'cf']b\]V]h'h\Y''YUfb]b['cZ'9b[']g\3

H\Y`fYdcfhg\ci`X`VY`X]j ]XYX`]bhc`h\fYY`gYWfjcbg.

GYWIJCb'%'Ub']blfcXi WIJcb'k\]W\XYgWf]VYg'h\Y'gdYWJZWdfcV'Ya žci h]bYg']lg']a dcffUbW'žXYZJbYg']lg'\_YmlYfa gžUbX'Yl d'U]bg'k\m]h]g'Ub']ggi Y']b'mci f'YXi WUlJcbU':WcblYl hUbX']bhYfbUlJcbU':mfl \$\$'k cfXgŁ

GYWIJcb"&."U"gi WVJbWbz"]bZcfa YX"UbX"Wf]hJWU"fYj ]Yk "cZh\Y"fY"Yj Ubh'G@5"]hYfUhi fY"fY"UhJb["hc"h\\$

## DUfh" "5bU`mg]gcZ8UhU

```
%" ```8]gWti fgY`5bU`mg]g
&" ```@YI]WJ``5bU`mg]g
' " ```GmbHJWf]W5bU`mg]g
( " ```D\cbc`c[]WJ``5bU`mg]g
) " ```Cff\c[fUd\]W5bU`mg]g
```

DUfn("'7cbWig]cbg'UbX'FYWcaaYbXUh]cbg'Zcf'HYUWX]b["

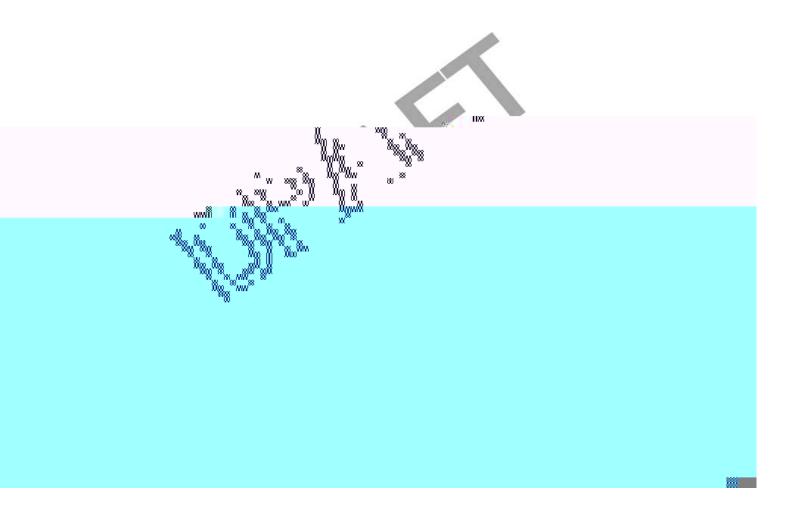
 $A\ cfY\ XY\ hJ]\ g\ k\ ]\ \ VY\ dfcj\ ]XYX\ Jb\ h\ Y\ JfghgY\ gg]\ cb\ cZ\ h\ Y\ Wci\ fgY\ \ dfcj\ ]$ 

 $\label{thm:continuous} \mbox{Hi fb]h]b$'gYhh]b$[.$'H\]g$'Ugg][$ba Ybh]g$'gi Va ]hhYX'h\fci [\'Hi fb]h]b$'UbX'ghi XYbhg`WUb'gYY'Hi fb]h]b$'g]a ]`Uf]hm fYdcfhg"$ 

# I BGK 'G7<CC@'C: '98I 75H€B'FI 6F = 7 # 998657? 'G<99H' 98GH) % \$

5ggYgga YbhHUg\_ @]hYfUhi fY fYj ]Yk

GdYWJZJW7 f]HYf]U	∵f1Ł2fŽŁ



GdYWJZJW7 f]HYf]U	∵f1Ł2fŽŁ

# Gi Va ]gg]cb cZ5ggYgga YbhHUg\_g

 $Gh\ XYbhg\ 'UfY\ 'YI\ dYWhYX\ 'hc\ 'di\ hh\ Y]f\ 'bUa\ Yg\ 'UbX\ 'gh\ XYbhbi\ a\ VYfg\ 'cb\ 'Yj\ YfmdU[\ Y\ 'cZh\ Y]f\ 'Ugg][\ ba\ Ybhg\ ''$ 

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

 $\bullet \ \ \, \text{K cf\_'gi Va ]} \\ \text{lh} \\ \text{X '\%' hc '\% 'XUmg 'UZhYf' h\ Y 'gh]} \\ \text{di ``UhYX 'XYUX`]} \\ \text{bY } \\$ 

- i bXYfgfUbX mci f'f][\hg'UbX'fYgdcbg]V]`]hJYg'Ug'U'gh XYbhUhl BGK
- VY`Uk UfY`cZd`U[]Uf]ga ž`Wcdmf][\hz'l BGK `Gh XYbh7cXY`cZ7cbXi WhUbX`5VWWdhUV`Y`l gY`cZ I BGK `=\forall H`F Ygci f\W\g`Dc`]\m\m
- VY 'Uk UfY 'cZh\Y 'ghUbXUfXg 'cZVY\Uj ]ci f'Yl dYWYX 'cZYj YfmcbY ']b 'h\Y 'l BGK 'Wca a i b]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 ž'ch\Yfg'k]``VY'bYk"'; U]b]b['U'gc`]X'i bXYfgHJbX]b['cZU``h\YfY`UhYX'UgdYWfg'cZ9@ ${\mathfrak G}$ 9'k]``\Y`d'mci 'a U\_Y'h\Y'a cghicZmci f'ghi X]Yg'UhI BGK "f\hd.#gi V\YWfi \\X\yg''\YfUfm'i bgk\\"YXi\\"Ui\#\`\]qY\#JVci \\Y\\]qY\\

# 7ci fgY GWX YXi `Y

# J]Yk 'WUgg'ha YhUV'Y

# H]a YHJV`Y

8UhY	Hmd Y	7cbh/bh
K YY_'%`&' '>i `m!'&- '>i `r	m@YWhifY	@Ub[i U[Y``YUfb]b['UbX``YUfb]b[']b'UbX'h\fci [\ U'gYWcbX``Ub[i U[Y``Ub[i U[Y'
		8 Y Z b h c bg. "@Ub[i U[Y ij g``]h Y f U Wh' "H\Y 'Z f g h j g g Y W c b X # / ] b [i U \`` Ub[i U[Y `Y Uf b Y f " H\Y `` Ub[i U[Y `Y Uf b Y f " H\Y `` Ub[i U[Y `Y Uf b]b [i U[Y `Y Uf b]b [i U[Y Ub X `W c a a i b] W h c b " HY I h Ub X `W c b h Y I h " : c f a g `Ub X a Y Ub]b [g " "8 ] ZZ Y f Y b h W c b W d h g `c Z " [f Ua a Uf " " H f U X ] h c b U ` j g `Z b W f c b U ` " [f Ua a Uf " " D \ c b c `c [] W U ` ž `Y I ] W U ` ž `g m b h U W f W Ub X ` X ] g W c i f g Y ` g m g h Y a g " ` H \ Y g d Y ``] b [ ` g m g h Y a " " H \ Y ` d i b W i Uh c b `g m g h Y a " " " 7 \ Ub [] b [ ` j ] Y k g `c Z " W c a d Y h Y b W Y " " "
		F YUX]b[g. '9a a ]hžA "ž'NVUfUW_]žA "ž'? ca YgUfcZž @"'UbX'Dc``cW_ž'>"'f&\$%( \z'7 \ dhg'% &"
K YY_'&.'' \$'>i`m!') 5i[igh	@YWh fY	H\Y`bUhifY`cZ`gdc_Yb`UbX`kf]hhYb``Ub[iU[Y
		Gdc_Yb'j g'k f]thYb'`Ub[i U[Y"8]ZYfYbWYg'VYtk YYbgdc_Yb'UbX'k f]thYb'thYl tg"''H\Y'fY`Ut]cbg\]d'VYtk YYbgdc_Yb'UbX'k f]thYb'Wcaaib]WUt]cb"''Cft\c[fUd\mžgWf]dh'UbX'`Umcit'Bcb!@Ut]b'gWf]dtg"''@Ub[iU[Y'g\]Jh'UbX'`Ub[iU[Y'W\Ub[Y"
		F YUX]b[g: 9a a ]htřA "žNVUfUW_]žA "ž? ca YgUfc <i>II</i> ž @"UbX`Dc``cW_ž>"`f&\$%( Łž7 \ dhg`' ž',
K YY_" .'* '5i [i gh! '‰ 5i [i gh	@YWi fY	H\Y'bUhi fY'cZZ]fgh'UbX'gYWcbX``Ub[i U[Y XYj Y`cda Ybh  : ]fgh'UbX'gYWcbX``Ub[i U[Y'UWei ]g]h]cb"''5Wei ]g]h]cb j g'XYj Y`cda Ybh'''8]ZZYfYbh'h\YcfYh]WU`j ]Yk g'cZ XYj Y`cda Ybh'''6hU[Yg']b'UWei ]g]h]cb"''H\Y UWei ]g]h]cb'cZgdc_Yb'UbX'k f]hhYb``Ub[i U[Yg"''H\Y ']hYfUWnj g'`Ub[i U[Y''YUfbYf.''G]a ]`Uf]h]Yg'UbX X]ZZYfYbWYg"'DfY!`]hYfUWh''''6]!`]hYfUWh''''C h\Yf'ZUWcfg UZYWh]b['Z]fgh'UbX'gYWcbX``Ub[i U[Y'UWei ]g]h]cb"'  F YUX]b[g.'  9a a ]hhz'A "z'NVUfUW]z'A "z'? ca YgUfcZZz'@''UbX Dc``cW_z'>"'f&\$%(\Lz'7\dhg'-!%%

		9a a ]htřA "ž'NVUfUW_]žA "ž? ca Yo Dc``cW_ž'>"`f&\$%( Łž'7 \dhg`( ž'+	yUfc <i>TIž @</i> " 'UbX
		5XX]h]cbU`fYUX]b[ g	
		6fck bž; "``>[efW [`Y fa E ba] W 7 >a`Y_ S` + % ++	7`Y1jeZ
ab¥ <u>a</u> 8 <b>b</b> ž%	<b>%</b> +,* )+	? Ybk cft\nž >"``FI <b>WSWX]b\</b> Y` <b>9b\</b> Y` <b>]gX`BfabgbW]9f]ab</b> ` @cb[ a Ubž'%, +	
		@cḃ[a Ubž%, +	\$ %

**@**0

	5gdYWM'AccX"'Jc]WY"'H\Y'UWéi]g]h]cb'cZh\Y'jYfVd\fugY"''H\Y'ghfiWhifYcZWUigYg"''HmdYg'cZ WUigYg"''8YdYbXUbhWUigYg"'
	F YUX]b[ g.
	9a a ]hř:A "ž'NVUfUW_]ž'A "ž'? ca YgUfc <i>Zž'@</i> ' 'UbX Dc``cW_ž'>" f&\$%( łž 7 \dhg '*
	5XX]h]cbU`fYUX]b[ g
	; U]fbgžF"/ FYXa UbžG"`'I adJ[Yi [fZI adVe' 7 I Dž%,*
	8fc[U'@'ž/ ' <iad\fymžg"'f&\$\$' sds`v<="" td="" ł"'9ds=""></iad\fymžg"'f&\$\$'>

C WcVYf	; YbfY'j g"'hYl h'``7c\Yg]cb"'8]ZZYfYbh'hmdYg'cZ Wc\Yg]cb.'fYZYfYbWYž'gi Vgh]hi hJcbž'Y``]dg]gž Wcbî bWf]cbž`Yl]WU``Wc\Yg]cb"``7c\YfYbWY"' 7cbj YfgUh]cbU``ghfi Whi fYg"``7fcgg!W\`hi fU` X]ZZYfYbWYg"
	F YUX]b[ g
	9aa]htřA "žNVUfUW <u>]</u> žA "ž?caYgUfc <i>Zž©</i> " UbX <b>Be"eW_ž≈žf&amp;\$%(dž3Xdfg)</b>
	5XX]
	DU`Hf]X[Yž6":f&\$\$*Ł":8]gWebfgW5b0`kmg]gž7\UdH/f`* f8]gWcifgY; fUaaUfŁ":@cbXcb.:7cbH]biia"
1	

1		Dc``cW_ž'>"`f&\$%( Łž'7 \dhg')		
		5XX]h]cbU`fYUX]b[g		
		DU`lf]X[Yž6"`f&\$\$*\E''6[eUagdeW3`S1ke[ež7\UdlfYf`*f8]gWtifgY; fUaaUfE"@cbXcb.`7cblf]biia"		
		DU]bhYfž7"f&\$\$%E"I bXYfghUbX]b['[YbfY'UbXfY[]ghYf.']ad`]WUh]cbg'Zcf'`Ub[iU[Y'hYUW]b[fWXUdhYf'%\$Ez]b'6ifbgž5"ž/'7cZZ]bž7"ffXgEf&\$\$%E"5bU`mg]b['9b[`]g\']b'U'[`cVU`'WcbhYIh'5'fYUXYf"@cbXcbžI?.'FcihYX[Y"		
		8 fc[U'@'ž/' <iad\fymž'g"'f&\$\$' dssds`v<br="" l"'9="">? WS`[`Y, 3`[`fdaVgUf[a` Xadbd[_Sdk fWSUZWdež7\UdhYf'**ž'7 fYUh]b['k Y``!cf[Ub]nYX'UbX Wc\Yg]j Y'hYI hg'fdd"',)!%\$-L"'6Yffmž'5i ghfU`]U.'HUf[Yh hYI hg"</iad\fymž'g"'f&\$\$'>		
		@UfgYb!: fYYa Ubž8"'f&\$\$' Ł"'7\UdhYf'+.'H\Y [fUa a Uf'cZX]gWci fgY"'+b'FW&UZ['Y '\$`YgSYW 8da_ YdSSdfa YdSSq`Yž6cghcb.FZa_ea`: W['Wz		
		7 Y`WY!A i fW]UžA "ž/ '9"'C`g\hU]b"'f&\$\$\\"7\\% +blfcXi Wh]cb'hc'8]g\\ci fgY'5bU`mg]g'5B8'7\& DfU[a Uh]\\\g']b'8]g\\ci fgY'5bU`mg]g"'+b'6[eUagde\\S`V 5a`f\\Jf[\s\YgSY\\F\\\S\UZ[\Y,39g[\V\\\\ad\ >S`YgSY\\F\\\\bUZ\\\\d\\Z\[Y.'7\Ua\\\f]X[Y] I b]jYfg]\miDfYgg"		
		H\cfbVi fmžG"'f&\$\$) Ł"'4Wka`V fZWeW fW UW A UWa]`Ub.'CIZcfXžI?"		
K YY_'%&.'%) 'C WhcVYf'! &%'C WhcVYf	@YWi fY	HYUW\Yf``Ub[i U[Y'Uk UfYbYgg		
		"HYUW\Yf"`Ub[i U[Y"Uk UfYbYgg"UbX"HYUW\]b[" @Ub[i U[Y"Uk UfYbYgg"UbX"dfcZYgg]cbU` XYj Y`cda Ybh		
		5ggYgga YbhBc"'&'Xi Y'%ghBcj Ya VYfž') 'da		
		F YUX]b[		
		5bXfYkgžG`f&\$\$%L"``H\Y``Ub[iU[Y`UkUfYbYgg`cZ h\Y`@&`hYUW\Yf.`±g`]adUWhidcb`dYXU[c[]WU` dfUWfJWY"`>S`YgSYW3iSdWWee#"f&L`+)!-\$"		

# FYgci fW/g

#### DfYgWf]VYX F Ygci fWYg

9a a ]hte A "z'NVUfUW\_]z'A "z'? ca YgUfcZz'@"'UbX'Dc``cW\_z'>"'f&\$%(\text{\flat}"@Ub[i U[Y'UbX``YUfb]b[.'5b]b\fcXi Wh]cb'Zcf'\hyUW\]b["f\text{\flat}"\9X\h]cb\text{\flat}"A Y`Vci fbY. CI D"

5XX]h]cbU`Vcc\_g.

@][\h\ck\bž\D"`A\"\UbX\Gd\UX\Už\B\"\f\&\\$%\\\L''\<\ck\\`\Ub[i\U[\Yg\\UfY\``\Y\Ufb\YX\`f\\L'\\C\I\Z\cfX\\I\\?\. C\I\D

9``]gžF"'f&\$%) Ł"I bXYfgHJbX]b[ 'gYWcbX``Ub[i U[Y'UWei ]g]h]cb"'Cl ZcfX'l ? . 'Cl D"

#### FYWca a YbXYX FYgci fWfg

 $5 \label{eq:control_state} 5 \label{eq:control_state} 5 \label{eq:control_state} 1 \label{eq:control_state} 5 \label{eq:control_state} 2 \label{eq:control$ 

6 UlghcbYžF "f% - ( Ł" 9 dS\_ \_ SdžC | ZcfX | b]j Yfg]hmDfYgg. "C | ZcfX"

6i fbgž5"ž/ '7 c ZZ]bž7 "'f9 XgŁ'f&\$\$%Ł"'3` Ske[`Y 7` Y [eZ [` S Y aTS^Ua` fW] f, 3 dMSVWdž@cbXcbžl ?. F ci hYX[Y"'

6i hhž·8 "ž: U\Ymž·F "ž: YYnž·G"ž·Gd]b\_gž·G"ž/ 'MJ`cdž·7 "`f&\$\$\$Ł"·Ge[`Y Xg` Uf[a`S^YdS\_ \_ Sd 3` Wj b^adWde Yg[VWz