

# MECH3110

A YVXUb]WU`8Yg][ b`%

HYfa`%Z&\$&&



7ci fgY`Cj Yfj JYk




## 7ci fgY'8YHJ]`g

I b]hg'cZ7fYX]h\*`

Gi a a UfmcZ\hY'7ci fgY

H\]g'Wci fgY'k ]`Wcb]bi Y'hY'XYj Y`cda YbhcZU'gmghYa Uh]WUddfcUWX'hc'dfcV'Ya 'gc'] b[ 'UbX'XYg][ b'hUh Wca a YbW'X ]b'YUf]Yf'Wci fgYg" #i'k ]`ZcW'g'cb'a UhYa Uh]WU'a cXY`b[ 'Zcf'XYg][ b'Udd']WU]cbg/ZcfW'Zck h'fci [ \ 'Wca dcbYb]g'UbX'UggYa V']Yg/VY'fz'WU]b'UbX' [ YUf'Xf]j Y'XYg][ b/fc` ]b[ 'Y'Ya YbhVYUf]b[ gY'YW]cb/XmbUa ]WU'm'cUXYX'Vc'hYX'WcbYW]cbg/g\UZhXYg][ b'UbX'YI d'cfY'hYgY ]XYUg ]b'hYfa g'cZ dfUW]WU'Udd']WU]cbg"

## 7ci fgY'5]a g

H\]g'Wci fgY'k ]`Wcb]bi Y'hY'XYj Y`cda YbhcZU'gmghYa Uh]WUddfcUWX'hc'dfcV'Ya 'gc'] b[ 'UbX'XYg][ b'hUh Wca a YbW'X ]b'YUf]Yf'Wci fgYg" H\Y'Wci fgY'Zc`ck g'cb'Zca 'hY ]b]fcXi W]cb'dfcj ]YX'Vm9B; ; %\$\$\$Z YghU' ]g\Yg'hY'a UWX ]bY'Y'Ya YbhXYg][ b'UddfcUWX'UbX'dfcj ]XYg'Ub'cddcfh ]b]mhc'Udd'm'hY'a YWU]b]WU' \_bck'YX[ Y'UbX'hYW]b]ei Yg[ U]bYX'Zca 'A A 5B & ( '\$\$'UbX'A A 5B' ( '\$\$'Gh'XYb]g'k ]` ]bhYfUW]Ug'dUfhcZU XYg][ b'hYUa zk \ ]Y'XYj Y`cd]b[ 'XYg][ b'gc'i h]cbg'Zcf'U'fYU ]gh]WdfcV'Ya 'cZfYUgcbUV'Y'g]nY'UbX'Wca d'YI ]m' H\Y'YW] fY'hc d]W]fY'U'h'WcgY'mhc'Ugg][ ba YbhYei ]fYa Yb]g'k ]h' U'VU'UbW'VY'hk'YYb'hY'cfm]UbX dfUW]WU''5ggYgga Ybhk ]` \Uj Y'U'ghfcb[ 'Ya d\Ug]g'cb'dfUW]WU'XYg][ b'\_bck'YX[ Y'UbX'g\_]`g'Ug'k Y`Ug'U \ ] [ \ 'gh]bXUfX'cZdfcZ]gg]cbU'k f]hYb'UbX' [ fUd\ ]WU'Wca a i b]WU]cb`"H\]g'k ]` ]bW] XY'fYgYUfW ]b[ ]bZca Uh]cb'Zcf'XYg][ b'Ugg][ ba Yb]g'UbX'gYUfW ]b[ 'Zcf'gc'i h]cbg'Ug'hUg\_'gdYW]Z]WU]cbg'VY'Wca Y'Ygg Wca d'Y'h'UbX'a cY'fYU ]gh]W'5'dfccZcZ'WcbW'dhdfch'hdY'k ]`VY'a Ubi Z]W] fYX'Z'UggYa V'YX'UbX'hY'ghY'hc Ybgi fY'hY'XYg][ b' ]g'ZUg]V'Y'UbX'Z' bW]cbg'Ug'WU]a YX"

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

5Z'Yf'gi W'W'ggZ `mWca d'Y]b[ 'h\]g'Wci fgY'Z'mci 'g\ci 'X'VY'UV'Y'hc.

@YUfb]b[ 'Ci hWca Y	95'GHU[ Y'%7ca dYh]bW]Yg
%'8Yg][ b'UbX']a d'Ya Ybhgc'i h]cbg'hc'cdYb!YbXYX'XYg][ b dfcV'Ya g	D9% "%žD9% "&žD9%) žD9% "&žD9% " žD9% "(
&"A UbU[ Y'U'XYg][ b'dfc'YW]UbX'VY'UV'Y'hc'd'Ubž'gW]YXi 'Y'UbX XcW'a Ybhk cf_'UW]j ]h]Yg ]b'UW]cfXUbW'k ]h' gh]bXUfX'dfUW]WU'"	D9% " žD9% "( žD9% "&žD9% " žD9% "( žD9% " "&žD9% " " žD9% " "
' ' '5ggYgg'hY'gUZ]fmcZYb[ ]bYYf]b[ 'ghfi W] fYg'UbX'Wca dcbYb]g' ]b U'a UWX ]bY'gmghYa 'YbWci bhY'fYX' ]b' ]bXi ghfm'	D9% " žD9% "( žD9% "&žD9% " žD9% "( žD9% " " žD9% " "( žD9% " )
( "'7ca a i b]WU]h'XYg][ b'XYW]g]cbg' ]b'U'Yb[ ]bYYf]b[ 'XYg][ b'fYdcfh hc' ]bXi ghfm]h]bXUfXg	D9% " žD9% " "%žD9% " "&žD9% " "(

HYUWX ]b[ 'GhfU]h[ ]Yg'

H\]g'Wci fgY'UHYa dhg'hc'UddfcI ]a UHY'U'hd]W'XYg][ b'k cf\_d'UW'Ybj ]fcba Ybh]b'k \]W'UWV fUHY'UbX  
dfcZ'gg]cbU'ei U']mifYgi 'hg'UfY'fYei ]fYX'U[ U]bghW'ghUbX'h]a Y'W'bgfU]bhgZ']bZ'fa Uhcb']g']bW'a d'YHY'cf  
W'cbZ]W]b[ 'UbX'h'Ua 'b'fUW]cb:]g'YggYbh]U"

@YW'fYg']b'h.]g'Wci fgY'UfY'XYg][ bYX'hc'W'j Yf'hY'h'fa ]bc'c[ m'W'fY'W'bw'dhg'UbX'h'W'b]ei Yg:]b'hY  
XYg][ b'cZa UW]bYg"'H\Ymg\ck '\ck 'hY'j Uf]ci g'h'W'b]ei Yg'UfY'Udd']YX:]b'dfUW]W'UbX'h'Y'XYH]g'cZ  
k \YbZk \YfYZ'UbX'\ck 'hYmg\ci 'X'VY'Udd']YX"

## 5ggYgga Ybh

5ggYgga YbhUg_	K Y][ \ h	8i Y'8UHŸ	7ci fgY'@YUfb]b[ Ci hW̄a Yg'5ggYggYX
%'HfUbgg ]gg]cb'5gg][ ba Ybh	( \$i	: f]XUmK YY_ '%\$ž&' .))	%ž'ž' ž(
&": UghYbYf'5gg][ ba Ybh	&\$i	: f]XUmK YY_ , ž&' .))	%ž' ž(
' " ; YUfVcl 'Dfchchmd]b[ Dfc'YVh	( \$i	; fci d'W̄bhfUW̄iXi Y': f]XUm K YY_ '&Vm&' .)) ž 9b[ ]bYYf]b[ 'XfUk ]b[ g'Xi Y A cbXUmK YY_) 'Vm\$- .\$\$ž : YUg]V]]migh Xm XcW a Ybh]b[ 'Yb[ ]bYYf]b[ UbU'mg]g'cZXYg][ b'Xi Y : f]XUmK YY_) 'Vm&' .)) ž 7ca d']UbW̄'h'gh]b[ 'k ]'VY \Y'X'Xi f]b[ 'YI Ua 'dYf]cX"	%ž'ž' ž(

## 5ggYgga Ybh%'HfUbgg ]gg]cb'5gg][ ba Ybh

Gi Va ]gg]cb'bcHŸg. 'F YdcfhŸc'VY'gi Va ]mYX'hc'Hi fb]h]b'cb'hY'W̄ci fgY'A ccX'Y'dU[ Y"  
8i Y'XUHŸ. : f]XUmK YY\_ '%\$ž&' .))  
8YUX']bY'žcf'UVgc'i hY'žU]. ')) 'XUm]g'UžYf'hY'Xi Y'XUHŸ"  
A Uf\_g'fYh fbYX. 'A Uf\_g'hc'VY'fYh fbYX'i dcb'fY'YUgY'cZžbU'a Uf\_g'fUžYf'YI Ua 'dYf]cXĒ"

8Yg][ b'cZU'hfUbgg ]gg]cb'gmghŸa 'hc'dfcj ]XY'a YW̄U]W̄'dck Yf'žcf'U[ ]j Yb'dfcW̄gg"

H\]g'Ugg][ ba Ybh]g'gi Va ]mYX'h'fci [ \ 'Hi fb]h]b'UbX'gh XYbhg'W̄b'gYY'Hi fb]h]b'gja ]Uf]mfYdcfŸg"

## 5XX]h]cbU'XYHJ]g

Gh XYbhg'k ]'k cf\_]b[ fci dg'hc'XYg][ b'U'hfUbgg ]gg]cb'gmghŸa "'D'YUgY'fYZf'hc'UggYgga Ybh[ i ]XY]bYg  
k ]h]b'HYUa g'žcf'ž f'hYf']bžcfa U]cb"

## 5ggYgga Ybh& : UghYbYf'5gg][ ba Ybh

Gi Va ]gg]cb'bcHŸg. 'F YdcfhŸc'VY'gi Va ]mYX'hc'Hi fb]h]b'cb'hY'W̄ci fgY'A ccX'Y'dU[ Y"  
8i Y'XUHŸ. : f]XUmK YY\_ , ž&' .))  
8YUX']bY'žcf'UVgc'i hY'žU]. ')) 'XUm]g'UžYf'hY'Xi Y'XUHŸ"  
A Uf\_g'fYh fbYX. 'Hk c'k YY\_g'UžYf'gi Va ]gg]cb

8Yg][ b'cZU'gmghŸa 'hUhi h]gYg'Vc'hžghYbYfg'hc'gi dddcfhj Uf]ci g'gfi W̄i fYg"

H\]g'Ugg][ ba Ybh]g'gi Va ]mYX'h'fci [ \ 'Hi fb]h]b'UbX'gh XYbhg'W̄b'gYY'Hi fb]h]b'gja ]Uf]mfYdcfŸg"

## 5XX]h]cbU'XYHJ]g

žX]j ]Xi U'Ugg][ ba Ybh'Gh XYbhg'k ]'XYg][ b'UbX'UbU'mgY'U'gfi W̄i fY'hUhi h]gYg'Vc'hYX'c]bhg"'D'YUgY  
fYZf'hc'UggYgga Ybh[ i ]XY]bYg'k ]h]b'HYUa g'žcf'ž f'hYf']bžcfa U]cb"

5ggYgga Ybh' .; YUfVcl 'Dfchc hmd]b[ 'Dfc ^YWh

8i Y'XUHy. ; fci d'WcbfUWhXi Y: f]XUmK YY\_ '&'Vm&' .) ) ž9b[ ]bYYf]b[ 'XfUk ]b[ g'Xi Y'A cbXUmK YY\_) 'Vm  
\$-.\$ž: YUg]V] ]migh XmiXcW a Ybh]b[ 'Yb[ ]bYYf]b[ 'UbU`mg]g'cZXYg][ b'Xi Y: f]XUmK YY\_) 'Vm&' .) ) ž  
7ca d`]UbW`hYgh]b[ 'k ]`VY`^Y`X`Xi f]b[ 'YI Ua `dYf]cX"  
A Uf\_g`fYh` fbYX. ``5``UggYgga Ybha Uf\_g`fYh` fbYX`k ]h.]b`hk`c`k`YY\_g`cZgi Va ]gg]cb`cZhY`fYgdYWh] Y  
XY`j] YfUV`Y"

8Yg][ b'UbX`UbU`mg]g'cZU`[ YUFYX`hfUbg a ]gg]cb`gmgh`a "": ]bU`XYg][ b`k ]`VY`dfchc hmdYX`UbX`hYghYX`Zc`f  
W`ca d`]UbW`"

5XX]h]cbU`XYHJ]`g

; fci d'UggYgga Ybh' ( 'a U]b`XY`j] YfUV`Yg.

%"; fci d'WcbfUWhf\$; E"8i Y: f]XUmK YY\_ '&ž&' .) ) "

&"9b[ ]bYYf]b[ 'XfUk ]b[ g`f%\$; E"8i Y'A cbXUmK YY\_) ž\$-.\$ž"

' "": YUg]V] ]migh XmiXcW a Ybh]b[ 'Yb[ ]bYYf]b[ 'UbU`mg]g'cZXYg][ b`f%\$; E"8i Y: f]XUmK YY\_) ž&' .) ) "

( ``7ca d`]UbW`hYgh]b[ `cZa Ubi ZJWh`fYX`[ YUFYX`hfUbg a ]gg]cb`dfchc hmdY`f&\$; E"7ca d`]UbW`hYgh]b[ 'k ]`  
VY`^Y`X`Xi f]b[ 'K YY\_`%%"

D`YUgY`fYZf`hc`UggYgga Ybh[ i ]XY`]bYg`k ]h.]b`HYUa g`Zc`f`Z`fh`Yf`]bZcfa Uh]cb"








		Xi gfm
	K cf_g\cd	%ghgYgg]cb'rcd]W'C dYb'Wcbgi 'fU]cb &bX'gYgg]cb'rcd]W'C dYb'Wcbgi 'fU]cb
K YY_%\$.%' 5df]'! '& 5df]`	@YWi fY	A cbXUm%) .\$\$!'%+. \$\$.'Di V'jW<c`]XUm Hi YgXUm%&.\$\$!'%( .\$\$.'C dYb'7 cbgi 'fU]cb
	K cf_g\cd	%ghgYgg]cb'rcd]W'C dYb'Wcbgi 'fU]cb &bX'gYgg]cb'rcd]W'C dYb'Wcbgi 'fU]cb

F Ygci fWg

DfYgWf]VYX`F Ygci fWg`

G\[ `Ymfj`A YW\Ub]W`9b[ ]bYYf]b[ `8Yg][ b`fG=I b]hgŁF "; ""6i XmbUg/ `? ">"B ]gVYhř`%#%`9XžA W fUk`< ]`"

F YWca a YbXYX`F Ygci fWg

I BGK `@]VfUfmk YVg]hY. `hhdg.## k k "`]VfUfmi bkg "YXi "Ui #`

A ccX`Y. [`hhdg.##a ccX`Y`h`hi bkg "YXi "Ui #c\[ \]b#bXYI "d\`d](#)

A ]WcgcZn

[HYUa g. `hhdg.##YUa g`a \]WcgcZn`Wca ##YUa #%- i ` U@Yi gUE A Hn!WnZ GcSk nZ Mk Wmeni Ui F!W: 8\\*A 6c % \( \\$h`fYUX`hUW &#Wcbj YfgUhcbg3\[ fci d=X1' U' VXY\( \\*!\), Y+!\( \) - U!- X& !\\*Z+\) VXU+\) \\$W/ h`bUbh=X1' Z\\*WU\( !Y+% \)!\(, XV!V, Y%\\$ , \\*+V- Z ZU`](#)

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

: YXVUW`cb`h`Y`Wci fgY`]g`[ U`h`Y`f`Y`X`d`Y`f`c`X`]W`mi g]b[ `j Uf]ci g`a YUbgž]bWf X]b[ `h`Y`I BGK  
a m9I dYf]YbW`dfcW`ggž]bZcfa U`X]gW`gg]cb`]b`h`Y`Z]bU`WUgg`Zc`f`h`Y`Wci fgYž`UbX`h`Y`]b`UbX`h`Y`YžU` %o

Gi Va ]gg]cb 'cZ5ggYgga YbhiHUg\_g

5ggYgga Ybhgi Va ]gg]cb 'UbX'a Uf\_]b[ 'Wf]hYf]U

YI Ua gžd`YUgY`gYY`hY`[9I.Ua.g](#)`k YVdU[ Y"

GdYWU`7 cbg]XYfUh]cb

≠mci `Uj Y`YI dYf]YbWXX`Ub`]`bYgg`cf`a ]gUXj Ybhi fY`VYmcbX`mci f`Wcbfcb`hUhk ]`]bHYfZYfY`k ]h`mci f

C i hWēa Y	9I d`UbUhjcb	9I Ua d`Y
Hja Y`YI H`bgjcb	Gh XYbhdfcj ]YXX`a cfY`hja Y h`gi Va ]h`hY`UggYgga Ybh	Y"[ ""%a cfY`k YY_`cZhja Y`[ fUbhYX`h`gi Va ]hU`fYdcfh
Gi dd`Ya YbUfm UggYgga Ybh	Gh XYbhdfcj ]YXX`Ub U`hYfbUH`UggYgga YbhUhU `UH`f`XUH`#]a Y	Y"[ ""U`gi dd`Ya YbUfmYI Ua `]g`gW`YXi `YX`Xi f]b[ `hY gi dd`Ya YbUfmYI Ua `dYf]cX`cZ`hY`h`fa
Gi Vghji H`]hYa	H`Y`a Uf_`Zcf`hY`a ]ggYX UggYgga Ybh]g`gi Vghji H`X k ]h`hY`a Uf_`cZ`Ubch`Yf UggYgga Ybh	Y"[ ""a Uf_`Zcf`E i ]n`%Udd`]YX`U`gc`Udd`]YX`Ug`a Uf_`Zcf E i ]n`&ž`a YUb]b[ `]ZU`gh XYbhUW`Y] YX`U`a Uf_`cZ &#`\$`\$`Zcf`E i ]n`%`UbX`k Ug [ fUbhYX`GdYW]U` 7cbg]XYfUhjcb`Zcf`E i ]n`&ž`U`a Uf_`cZ`&#`\$`k ci `X`VY Udd`]YX`Zcf`E i ]n`&ž`YHW
9I Ya dhjcb	5`W`i fgY`a Uf_g`UfY fYW`W`UH`X`YI W`X]b[ `h`g UggYgga YbhUbX`]hg k Y][ \h]b[	Y"[ ""H`Y`W`i fgY`Ug`Ub`UggYgga YbhgfI W`h`fY`cZ `!`5gg][ ba Ybhg` ` \$i ž `!`@JV`fYdcfh` \$i ž `!`: ]bU`9I Ua `( \$i " `Z`hY`@JV`fYdcfh]g`a ]ggYX`UbX`gh XYbh]g [ fUbhYX GdYW]U`7cbg]XYfUhjcbž`hYb`hY`UggYgga Ybh gfI W`h`fY`a UmVY`fYk Y][ \h`X`Ug`Z`ck`g. `!`5gg][ ba Ybhg` ) \$i `!`: ]bU`9I Ua `) \$i Ug`h`ci [ \`hY`@JV`fYdcfhX]X`bchYI ]gh
Bcb!ghUbXUfX	7ci fgY`7ccfX	%o %o %o h

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

I BGK `Ug`Ub`cb[c]b[ `Wca a ]ha Ybhlc`ZcghYf]b[ `U`W`hi`fY`cZ`YUfb]b[ `]bZcfa YX`VmiUWUXYa ]W]bhY[ f]m`5`  
I BGK `gh`XYbhg`Uj`Y`U`fYgdcbg]V`]mhc`UX\YfY`hc`h`g`df]bW]d`Y`cZUWUXYa ]W]bhY[ f]m`D`U[ ]Uf]ga  
i bXYfa ]bYg`UWUXYa ]W]bhY[ f]m]UbX`]g`bchlc`YfUHYX`Uhl`BGK`"B`SY[Sde\_`SfG@E|`[e VWX`W`Se ge[`Y`  
fZWi`ad/e ad[VWSe aXafZWde S`V`bSee[`Y`fZW\_`aXSe kagdai`ž

D`U[ ]Uf]ga`]g`U`mdY`cZ]bhY`YWfi`U`h`Y`Zi`#iW]b`hU`\_Y`a`UbmiZcfa`gžZca`XY`]VYfUHY`WXYU]b[ `hc`UWUXYbH`m`  
Wcdm]b[ `Zca`U`gci`fWY`k`]h`ci`hUW`bck`YX[`Ya`Ybh`I`BGK` `Ug`dfcXi`WYX`U`k`YVg]hY`k`]h`U`k`YU`h`cZ`  
fYgci`fWY`g`hc`gi`ddcfhgh`XYbhg`hc`i`bXYfgHUbX`UbX`Uj`c]X`d`U[ ]Uf]ga`ž`]g]h`[gh`XYbh`i`bgk`"YXi`"Ui`#d`U\[ \]Uf\]ga`"](#)  
H\Y`@YUfb]b[ `7`YbfY`Ugg]ghg`gh`XYbhg`k`]h`i`bXYfgHUbX]b[ `UWUXYa ]W]bhY[ f]m]UbX`\ck`bchlc`d`U[ ]Uf]gY`  
H\YmiU`gc`\c`X`k`cf\_g\cdg`UbX`W]b`\Y`d`gh`XYbhg`cbY!cb!cbY"

Mci`U`fY`U`gc`fYa`]bXYX`h`UhW]fYZ`h`ja`Y`a`UbU[`Ya`Ybh]g`Ub`ja`dcffUbhdufhcZgh`XmiUbX`cbY`cZ`h`Y`  
]XYbh]Z`YX`W]i`gYg`cZ`d`U[ ]Uf]ga`]g`dccc`f`h`ja`Y`a`UbU[`Ya`Ybh`G`h`XYbhg`g`l`ci`X`U`ck`gi`ZZWY`bh`h`ja`Y`Z`c`f`

5 WUXYa ]WbZcfa Uh]cb

7 fYX]hdc]bHg

7 ci fgY WfYX]h]g WUW UHYX ]b i b]hg! C Z 7 fYX]hfl C 7 E "H\Y bcfa U k cf\_cUX YI dYWWUh]cb ZcfcbY I C 7 ]g Uddfcl ]a UHY m&) \ci fg dYf hYfa " H\ ]g ]bW XYG WUgg WcbhUW\ci fgZdfj UHY ghi XnZchYf YUfb]b [ UW]j ]hYgZdfYdUfU]cb UbX h]a Y g dYbhc b U UggYggUV Y k cf\_ "

A cghWci fgYk cf\_ Wci fgYg Uhi BGK UfY \* I C 7 UbX ]bj c j Y Ub Ygh]a UHYX %) \$ \ci fg hc Wca d YHY Zcf Vch fY [ i Uf UbX ]b hYbg ] Y hYfa g " 9 UWX Wci fgY ]bW XYG U dfYgW ]VYX bi a VYf cZ \ci fg dYf k YY \_ f k E cZ gWXYXi YX ZJW !hc! ZJW UbX #cf cb ]bY WcbhUW 5 b m UXX ]hcb U h]a Y VY mcbX h Y dfYgW ]VYX WcbhUW \ci fg g \ci X VY g dYbh ]b a U\_ ]b [ gi fY h U h m c i i b X Y f g h U b X h Y Y W h i f Y a U h Y f ] U z W e a d Y h ] b [ h Y g Y h U g g ] [ b a Y b h g z Z f h Y f f Y U X ] b [ z U b X f Y j ] g ] b [ Zcf U b m Y I U a ] b U h ] c b g "

C b!WJa di g WUgg UHYbXUbW

HH%&\$&&I D85H9H  
!!!!!!!!!!!!!!!!!!!!!!!!!!!!

Di V ]WX]ghUbW]b [ WcbX]hcbg'a i ghVY Zcck YX Zcf U ZJW !hc! ZJW WUggYg " Hc Ybgi fY h ]gZcb mghi XYbHg Ybfc YX ]b hcgY WUggYg k ] VY Uck YX ]b h Y fcca " B c c j Y f i Y b f c a Y b h ] g U c k Y X ] b Z J W ! h c ! Z J W W U g g Y g " G h X Y b h g Y b f c Y X ] b c b ] b Y W U g g Y g W U b g k U d h Y ] f Y b f c a Y b h Z f c a c b ] b Y h c b ! W J a d i g W U g g Y g V m G i b X U m z K Y Y \_ % " D Y U g Y f Y Z f h c m c i f W e i f g Y f g A ] W c g c z h Y U a g U b X A c c X Y g ] h Y g Z c f a c f Y ] b Z c f a U h ] c b U V c i h W U g g U H Y b X U b W Z c f ] b ! d Y f g c b U b X c b ] b Y W U g g g Y W h ] c b g # U W ] j ] h Y g "

Mci f \YU h UbX h Y \YU h c Z h c g Y ] b m c i f W U g g ] g W ] h W m ] a d c f U b h M c i a i g h g h U m U h \ c a Y ] Z m c i U f Y g ] W \_ c f \ U j Y V Y b U X j ] g Y X h c g Y Z ] g c U H V m B G K \ Y U h c f [ c j Y f b a Y b h U i h c f ] h Y g " 7 i f f Y b h U Y f r g U b X U ] g h c Z \ c h g d c h g W U b V Y Z c i b X \ Y f Y " M c i k ] b c h V Y d Y b U ] g Y X Z c f a ] g g ] b [ U Z J W ! h c ! Z J W U W h j ] m i X i Y h c ] b Y g g c f U f Y e i ] f Y a Y b h i c g Y Z ] g c U H " K Y k ] k c f \_ k ] h m c i h c Y b g i f Y W c b h i b i ] m c Z Y U f b ] b [ X i f ] b [ m c i f ] g c U h ] c b U b X \ U j Y d U b g ] b d U W Z c f m c i h c W U W X i d c b U b m W c b h Y b h c f Y U f b ] b [ U W h j ] h Y g m c i a U m a ] g g " K \ Y f Y h ] g a ] [ \ h b c h V Y d c g g ] V Y z U b U d d ] W U h c b Z c f Z Y f f Y a ] g g ] c b a U m V Y X ] g W g g Y X " : i f h Y f ] b Z c f a U h ] c b ] g U j U ] U V Y c b U b m W e i f g Y A c c X Y c f H Y U a g g ] h "

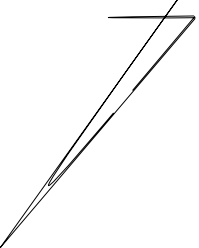
b W f h ] b W U g g f c c a U b X U V c f U h c f m g ] h U h ] c b g k \ Y f Y d \ n g ] W W X ] g h U b W ] b [ W U b b c h V Y a U ] b h ] b Y X c f h Y f Y ] g U \ ] [ \ f ] g \_ h U h ] h W U b b c h V Y a U ] b h ] b Y X z Z J W a U g \_ g k ] V Y W c b g ] X Y f Y X a U b X U h c f m D D 9 Z c f g h i X Y b h g U b X g h U Z Z

: c f a c f Y ] b Z c f a U h ] c b z d Y U g Y f Y Z f h c h Y  
: 5 E g . \ h t d g . # k k " W e j ] X ! % " i b g k " Y X i " U i # g U Z Y ! f Y h f b ! W J a d i g ! Z J e g

; i ]XY]bYg

5 gh XYbHg UfY YI dYWWX hc fYUX UbX VY ZJa ]]Uf k ]h I BGK [ i ]XY]bYg UbX dc ]Wg" b dUf h W Ufz gh XYbHg g \ci X VY ZJa ]]Uf k ]h h Y Zcck ]b [ .

- [5HYbXUbW](#)
- [I BGK 9a U\] 5XXfYgg](#)
- [GdYWU 7cbg\]XYfU\]cb](#)





- [5WXYa JW<cbYgmUbX`D`Uf\]ga](#)

⇒ U[ Y`7 fYX]h

5ddYbX]l . '9b[ ]bYYfg'5i ghfU`U'f95E'DfcZYgg]cbU`'9b[ ]bYYf'7ca dYhYbWm  
 GHUbXUfX

Dfc[ fUa 'hYbXYX'@YUfb]b[ 'Ci hWta Yg	
? bck `YX[ Y'UbX'g_]`VUgY	
D9%"%7 ca dfY\Ybg]j YzhYcfmVUgYX'i bXYfghUbX]b[ 'cZhY'i bXYfd]bb]b[ 'bUh fU`UbX d\mg]WU`gWYbWg'UbX'hY'Yb[ ]bYYf]b[ 'Z bXUa YbH'g'Udd']WUV'Y'hc'hY'Yb[ ]bYYf]b[ 'X]gWd`]bY	
D9%"&'7 cbWdh U`i bXYfghUbX]b[ 'cZhY'a UhYa Uh]Wg'z'bi a Yf]WU`UbU'mg]g'ghUhgh]Wg'z'UbX Wta di h'f'UbX']bZ'fa Uh]cb'gWYbWg'k \]W' i bXYfd]b'hY'Yb[ ]bYYf]b[ 'X]gWd`]bY	
D9%" " 'h!XYdh'i bXYfghUbX]b[ 'cZgdYWU`]ghVcX]Yg'cZ_bck `YX[ Y'k ]h]b'hY'Yb[ ]bYYf]b[ X]gWd`]bY	
D9%"('8]gWfba YbhcZ_bck `YX[ Y'XYj Y`cda YbhUbX'fYgYUfW'X]fYW]cbg'k ]h]b'hY Yb[ ]bYYf]b[ 'X]gWd`]bY	
D9%" ) ? bck `YX[ Y'cZYb[ ]bYYf]b[ 'XYg][ b'dfUW]W'UbX'WcbhYi h U`ZUW'c'fg]a dUW]b[ 'hY Yb[ ]bYYf]b[ 'X]gWd`]bY	
D9%"* 'i bXYfghUbX]b[ 'cZhY'gWc'dYz'df]bWd`Yg'z'bcfa g'z'UW'W'ci bHUV']h]Yg'UbX'Vci bXg'cZ gi gh]bUV'Y'Yb[ ]bYYf]b[ 'dfUW]W' ]b'hY'gdYW]ZWX]gWd`]bY	
9b[ ]bYYf]b[ 'Udd']WU]h]cb'UV']]m	
D9%"%5dd`]WU]h]cb'cZYghUV]g\YX'Yb[ ]bYYf]b[ 'a Yh'cXg'hc'Wta d'Yi'Yb[ ]bYYf]b[ 'dfcV'Ya gc'] ]b[	
D9%"&'&: 'i YbhUdd']WU]h]cb'cZYb[ ]bYYf]b[ 'h'W]b]ei Yg'z'hc'g'UbX'fYgci fW'g	
D9%" " '5dd`]WU]h]cb'cZgmg'hYa Uh]WYb[ ]bYYf]b[ 'gmb'hYg]g'UbX'XYg][ b'dfcW'ggYg	
D9%"('5dd`]WU]h]cb'cZgmg'hYa Uh]WUdd'fcUW'Yg'hc'hY'WcbXi W'h]UbX'a UbU[ Ya YbhcZYb[ ]bYYf]b[ 'dfc'YW'g	
DfcZYgg]cbU`'UbX'dYfgcbU`'Uhf]Vi hYg	
D9' "%9h]WU`'WcbXi W'h]UbX'dfcZYgg]cbU`'UW'W'ci bHUV']]m	
D9' "&'9ZYW]j Y'cfU`'UbX'k f]hYb'Wta a i b]WU]h]cb']b'dfcZYgg]cbU`'UbX`'UmXca U]bg	
D9' " '7fYUh]j Yz']bbcj Uh]j Y'UbX'dfc!UW]j Y'XYa YUbcif	
D9' "( 'DfcZYgg]cbU`'i gY'UbX'a UbU[ Ya YbhcZ]bZ'fa Uh]cb	
D9' ") 'C'fXYf'ma UbU[ Ya YbhcZgY'z'UbX'dfcZYgg]cbU`'WcbXi W'h	
D9' "*" '9ZYW]j Y'hYUa 'a Ya VYfg\]d'UbX'hYUa ``YUXYfg\]d	