

# **COMD5001**

⇒hYfbUh]cbU`8YjY`cdaYbhDc`]Wm



# 7 ci fgY Cj Yfj ]Yk

### GHJZZ:7cbHJWhi8YHJ]`g

### 7cbj Ybcfg

BUa Y	9a U]`	5j U]`UV]`]lm	@cWUh]cb	D\cbY
?f]g\bU`?" G\fYgh\U	_f]g\bU"g\fYgh\U4 i bgk "YXi "U i_	6mUddc]bha Ybh	F cca '%) % A cfj Yb 6fck b 6i ]`X]b[	\$(%%) %%% %

### @YWhi fYfg

BUa Y	9a U]`	5j U]`UV]`]lm	@cWUh]cb	D\cbY
8 f 8 ]YfXfY K ] WcW_	gcgg4 i bgk "YXi "Ui	j ]U'Ya U]` Uddc]bha Ybh` XY]XfYk]:Wcl 4 mU\ cc"Wca		

### GWXcc``7cbHJWhʻ±bZcfa Uh]cb

GWXcc``cZGcWJU``GWJYbWYg

Fcca '%) -

A cfj Yb 6fck b 7 &\$

Ya U]`. 'gcgg4 i bgk "YXi "Ui

d\cbY. '\$&'-',) '% \$+

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

I BGK '5frgž8Yg][ b'UbX'5fW,]hYWi fY'? Ybg]b[ hcb'UbX'DUXX]b[ hcb'WJa di gYg'UfY'Vi ]'hcb'5Vcf][ ]bU' @UbXg"'K Y'dUmci f'fYgdYWg'hc'h\Y'6]X'][ U''UbX'; UX][ U''dYcd'Yg'k \c'UfY'h\Y'7i ghcX]Ubg'cZh\YgY'`UbXg" K Y'UW\_bck 'YX[ Y'h\Y'5Vcf][ ]bU''UbX'HcffYg'GHfU]h=g'UbXYf'dYcd'Ygž'h\Y': ]fgh5i ghfU']Ubgžk \cgY'`UbXgž k ]bXg'UbX'k UhYfg'k Y'U``'bck 'g\UfYž'UbX'dUmfYgdYWhc'h\Y]f'i b]ei Y'j U'i Ygž'UbX'h\Y]f'Wcbh]bi ]b[ 'UbX YbXi f]b[ 'W 'h fYg'k \]W. 'XYYdYb'UbX'Ybf]W. 'h\Y'`]ZY'cZci f'bUh]cb'UbX'Wca a i b]h]Yg'''

### 5ggYgga Ybh

5ggYgga Ybhgʻg\ci`X'VYʻfYZYfYbWX`]b`UWWcfXUbWY`k]h\`h\Y`GW\cc``cZGcWJU``GWJYbWYg`F YZYfYbWJb[; i]XYžUj U]`UV`Y`Uhi\<u>hhdg.##gcVJU`gWJYbWYg"Ufhg"i bgk "YXi "Ui #ghi XYbhg#fYgci fWYg#dc`]WJYg![i]XY`]bYg#</u>"

5ggYgga YbhhUg_	K Y][ \h	8i Y <sup>.</sup> 8UHY	7 ci fgY`@YUfb]b[ Ci hWca Yg`5ggYggYX
%"`A ]X!HYfa 'F YZYW¶j Y 9ggUm	&) ı	&(#\$*#&\$&& <sup>:</sup> %%) - <sup>:</sup> DA	% <del>`</del> &
&"; fcid'UWNjj]hm	&) ı	\$, #\$+#&\$&&`%%) - `DA	&ž¨'
' "'F YgYUfW\'DUdYf	) \$1	\$) #\$, #&\$&&`%%) - `DA	&ž¨'

### 5ggYgga Ybh% A ]X!HYfa FYZYWhjj Y 9ggUm

5ggYgga Ybh`Yb[ h\. 5g'XYg\f]\YX\VY`ck 8i Y'XUhY. &( #\$\* #&\$&&'\%) - DA

\*\$\$`k cfX`fYZYWfj Y`YggUm`VUgYX`cb`W`Ugg`a UhYf]U`gž`fYUX]b[ gž`UbX`hi hcf]U``X]gW gg]cbg"`K f]hhYb`ZYYXVUW\_UbX`U`a Uf\_`k]```VY`dfcj ]XYX`k]h\]b`&`k YY\_g`cZgi Va ]gg]cb"`K f]hhYb`ZYYXVUW\_`UbX`U`a Uf\_`k]```VY`dfcj ]XYX k ]h\]b`&`k YY\_g`cZgi Va ]gg]cb"

H\]g`Ugg][ ba Ybh]g`gi Va ]h\YX`h\fci [\`Hi fb]h]b`UbX`gh XYbhg`WUb`gYY`Hi fb]h]b`g]a ]`Uf]hmfYdcfhg"

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

9ggUmei Ygh]cb. K \Uh\_Ym]XYUg`\Uj Y`mci ``YUfbYX`UVci hXYj Y`cda Ybhdc`]WhZfca 'h\Y`Wci fgY`gc`ZUf3`

\$\times \times \

5 gi [ [ YghYX ghfi Whi fY cZfYZYWhji Y YggUma ] [ \hvY. ]

% =blfcXi Wijcb fk \Uhijg h\Y \_Ymh\]b[ 'mci '\Uj Y ``YUfbYX#gi fdf]gYX#W\U``Yb[ YX 'mci 3 ff %\$\$ k cfXgŁ'
&" : ]fghhcd]W#\Ya Y#Uf[ i a Ybhk ]h\ 'gi ddcfh]b[ 'Yj ]XYbWY 'UbX 'mci f' UbU'mg]g 'ff &\$\$ k cfXgŁ'
' " GYWcbX hcd]W#\Ya Y#Uf[ i a Ybhfr &\$\$ k cfXgŁ'

("7cbWig]cbfr%\$\$kcfXgŁ

#### A Uf\_]b[ 'fi Vf]Wg. '

: (	U]``f <b>\</b> Y`ck ') \$Ł[	DUgg f <b>)</b> \$ '*(Ł	7 fYX]hft)	8]gh]bWh]cb	< ][ \
			+(Ł		8]gh]bWh]cb
				f#) ' ', (Ł	51 )
					fl) %\$\$Ł

			·
FYZYWNJ Y Yb[U[YaYbh k]h\ fYUX]b[gž gYa]bUfg'UbX X]gW gg]cbg f+\$1 Ł			

 $fc_{e} df S^ ZddZ_N$ 

6i ]`X]b[ 'cb'h\Y'gYa ]bUfg'UbX'[ fci d'k cf\_žmci 'k ]``k cf\_k ]h\ 'mci f'[ fci d'a Ya VYfg'UbX'XYj Y`cd'U'dc`]\mathbb{M} gi Va ]gg]cb'cZ'UddfcI "'\%\$\\$'k cfXg'\UgYX'cb'mci f'[ fci d'g'dc`]\mathbb{M}\dcg]h]cb'cb'h\Y'Zc``ck ]b[ 'g\WbUf]c.

%"H\Y'5i ghfU`]Ub'; cj Yfba Ybh\Ug'a UXY'U'WU``Zcf'gi Va ]gg]cb']b'h\Y'dfcW'gg'cZfYj ]Yk ]b['h\Y'ZcfY][ b'U]X dc`]Wn'

&"`A]b]ghYf`Zcf`:cfY][b'5ZJJ]fg`\UjY`UbbcibWYX`U`Wcbgi`hUh]cb'dfcWYgg`hc`[i]XY`U'bYk`5ighfU`]UbXYjY`cdaYbh'dc`]Wh'H\]g'dc`]Whk]```Xf]jY`h\Y`;cjYfbaYbh'gj']bhYfbUh]cbU``XYjY`cdaYbhYZ/cfhg`]b'giddcfhcZqYWf]hmž'dfcqdYf]mmž'UbX`fYg]`]YbWY`]b'h\Y`=bXc!DUWZ]W

""6i ]X]b[ 'cb'h\Y'dfYj ]ci g'dc`]Whž'h\Y'bYk 'dc`]Whk ]``[i ]XY'5i glfU`]Ufg'XYj Y`cda Ybhdfc[ fUa 'UbX'Ybgi fY ]hfYa U]bg'U`][ bYX'k ]h\'h\Y'; cj Yfba Ybhg'glfUhY[ ]Wdf]cf]hJYg"'H\Y'dc`]Whk ]```Wcj Yf'XYj Y`cda Ybhdfc[ fUa UWjj ]hJYg'Ug'k Y```Ug'k ]XYf'[ cj Yfba Ybh]b]hJUhj Yg'h\Uhgi ddcfh']bhYfbUhjcbU``XYj Y`cda Ybh" \dix ]```U`gc fYZYWh h\Y'; cj Yfba Ybhg']bwYUgYX'Ya d\Ug]g'cb'glfUhY[ ]WUbX'YWcbca ]WdUffbYfg\]dg']b'h\Y'\dix Xc!DUWJZJWUbX']hg DUWJZJWGhYd!i d"'H\Y'bYk 'dc`]Whk ]```fYZYWih\Y'; cj Yfba Ybhg'd`Ub'hc'fYhU]b'U'hUf[ YhYX'UbX'YZZJWJYbh XYj Y`cda YbhVi X[ YhcZ' ( 'V]`]cb'dYf'mYUf"

(": cf:XYHJ]`g`cZh\Y`dc`]Whž'W\YW\_ci hih\]g``]b\_, `\hdg.#k k k "XZJh'[cj "Ui #XYj Y`cda Ybh#Ji ghfU`]Ug! XYj Y`cda Ybh#Ji gcZdc`]Whigi Va ]gg]cbgž'W\YW\_ci hih\]g``]b\_.`

!'6m7\i fW.'U[YbWYg'bYkk cf

! 6m79D5F

1.6 m/A = 7.5 < .5 i ghfU

! '6m8Yj Y`cda YbhDc`]Wm7YblfY

Hc`\UjY`U`gYbgY`cZ8: 5H'g`XYjY`cda Ybhdc`]\\mdf]cf]h]Yg`fDfY!7CJ=8!% \\dotz\gYY`A]\b]ghYf`\\zf`\\bhYfbUh]\cbU`8YjY`cda Ybh\\dot\]Y`g\_YmbchY`gdYY\\\\Uhh\Y`\&\\\$5i ghfU`]U`5]X`7cb\\dotZf\b\\.

7@=7?'<9F9

.

 $H\[g'Ugg][ba\Ybh]g'gi\Va\]hhYX'h\fci\[\\'h\Y']bX]j\]Xi\U```]b\_g'i\ bXYf'h\Y'5ggYgga\Ybhz'bchh\fci\[\\'h\Hi\fb]h]b'' C\b`mcbY'gi\Va\]gg]cb']g'fYei\]fYX'dYf'[fci\d''$ 

#### FiVf]Wg Zcf [fcidgiVa]gg]cb.

	: U]``fWY`ck ') \$Ł	DUggif)\$' '*(Ł	7 fYX]hˈft*)	8]gh]bWh]cbf+) ,(Ł	< ][ \
			+(Ł	·	8]gh]bWh]cbf]) `%\$\$Ł
HYUa k cf_	Bc'Yj]XYbWY'cZ	Gi dYfZJWJU`	5XYeiUhY	DUfhjWjdUhjcb	8]gh]bWh]cbidig
f1 \$1 Ł	Wcblf]Vi l]cb hc	dUfhJWJdUhJcb^]b	dUfh]W]dUh]cb	Zfca 'h\Y'ghUfh	gi ddcfhjb[
	h\Y`dfcYWh	hYUa	UbX'hYUa'k cf_	cZh\Y`dfcYWV	ch\Yf <sup>.</sup> hYUa
		`Ugha ]bi hY	Vihik]h\XUmg	UWAji Y`m	a Ya VYfgʻk ]h\
		UXX]h]cb cZ	cf'U'k YY_'cZ	dfcdcgY	Wcbghfi Whjj Y

E VOVE III ANV		ZYYXVUW <u>Ł</u>	Wcblf]Vi l]cb k]h\ci hj U`]X fYUgcb	a YYIJb[g/ Ybgi fY`ZU]f k cf_`cUX X]gIf]Vi IJcb	ZYYXVUW <u></u>
	BcfYZYfYbWYho 8:5H'gdc`]Wm		Gi Va ]gg]cbʻ]g [YbYfU``m		
dc`]Wmi	df]cf]h]Yg/	8:5H'dc`]Wm	ZcwigYX Vihih\Y		
			HUf[Yh]b[]gbch UgWYUfUbX]g		
		UbX <sup>*</sup> X]fYWh]cb	[YbYfU`]b		
	dc`]Wmg\ci`X VY``_Y'k]h\cih	,	bUh fY"		
		, ,	5XjcWUWm		
	↑ghZWhcb f]"Y"		hYbXg'hc'hU_Y		
	U`"fUbh"`cZk \Uh h\Y`[ cj Yfba Ybh		cb`g]XY`UbX`]g bchVU`UbV\YX		
	-	,			
	g\ci `X'XcŁ				
1			I	I	

	\$!(-।	) \$`!`*) ı `	*) · ·+(I	+) ' ', (	2 <sup>-</sup> , )ı
Nf]hYf]U				8	< 8
	: @	D	7		
n J``a'UhX'	a UhYf]U`gža]	Li Ul`UV`Y	k]h\fY`YjUbh	9a d`cmgʻUʻk]XY	<u></u>
, - 0	gWcbWYdh]cb			_	fyzywnjy
	cZa YUb]b[ gž		XcYgʻbch		UddfcUVX hc
	_ ~		9	l- ~	gcifWYgY`YWgcb
	Y'cf'bc'i gY	Yj]XYbVW <sup>·</sup> cZ	YZZYWAji Y`m	cZh\Y``]hYfUhifY	Uddfcdf]UhY hc
	cZYj]XYbW	]bXYdYbXYbh		UbX^[ccX^fYgYUfW	_
				g_]``g" 5 Wca dYhYbh	· ·
		00	Cj Yf!fY`]UbWY`cb		\][\``Yj Y``cZ
		-			]bXYdYbXYbh
			cVj]cigʻgcifWygž		h\ci[\h]b
			gi [[Ygh]b[	igY`cZYj]XYbWY"	cWhb[fYei]fYX
		a UhYf]U`g`]g'j Yfm	`]a ]hYX`fYgYUfWX a l``a"		]bZcfa Uh]cb"
		]a ]hYX UbX#cf	9_J 9		
		`Uf[ Y`m]ffY`Yj Ubh'			
"'7 f]h]WU`	Bc'Yj]XYbW		5 MY a dhg hc	Dfcj ]XYg	5bU`mg]gʻ]g
	cZWfjhjwu`			dYfgi Ug]j Y	0-0 -0
JbX Uf[i	UbU`mg]g	k\Uhi]gʻfYei]fYX	UbX'YI d`U]b'bch	UbU`mg]gʻcZh\Y	
Ybhg			1 ghk \Uh]h]g Vi h	~ ~	
f) \$1 Ł		0-0		XYj Y`cd`U`WYUf	
		_		UbXifcVi gh	
		0 0 3		Uf[iaYbh"7Ub	
		UggYfh]cbgžhU_Yg Uh`ZUVY`;U`iY		gmbh\Yg]gY`U biaVYfcZ	
		,	0	WcbW/dhgicfiZJWhcfg	
				]bhc :U:`Uf[ Yf:]XYU"	
			Wf]lf]WU``miYb[ U[ Y		
			k]h\`h\Y`Yj]XYbW	,	
		WU]a gʻUg	hc'Yld`cfY']hg	]a ]hUh]cbg cZ	
		'Wcaacb	0	j Uf]ci g	
		-	K f]h]b[ dfYgYbhg	- 0	
		k]h\cihYj]XYbWY"		_ ~ ~	
		_	O .	]a ]hYX'hc	
		dccfmiYl dfYggYX UbX#cfi bXYf!	XYJYCOJNZIM	gYWcbXUfmigci fWYg	
		XYj Y`cdYX"			
		Alj i cui A			

5YXWChmixlaflmiaci fVVa Uf % a t

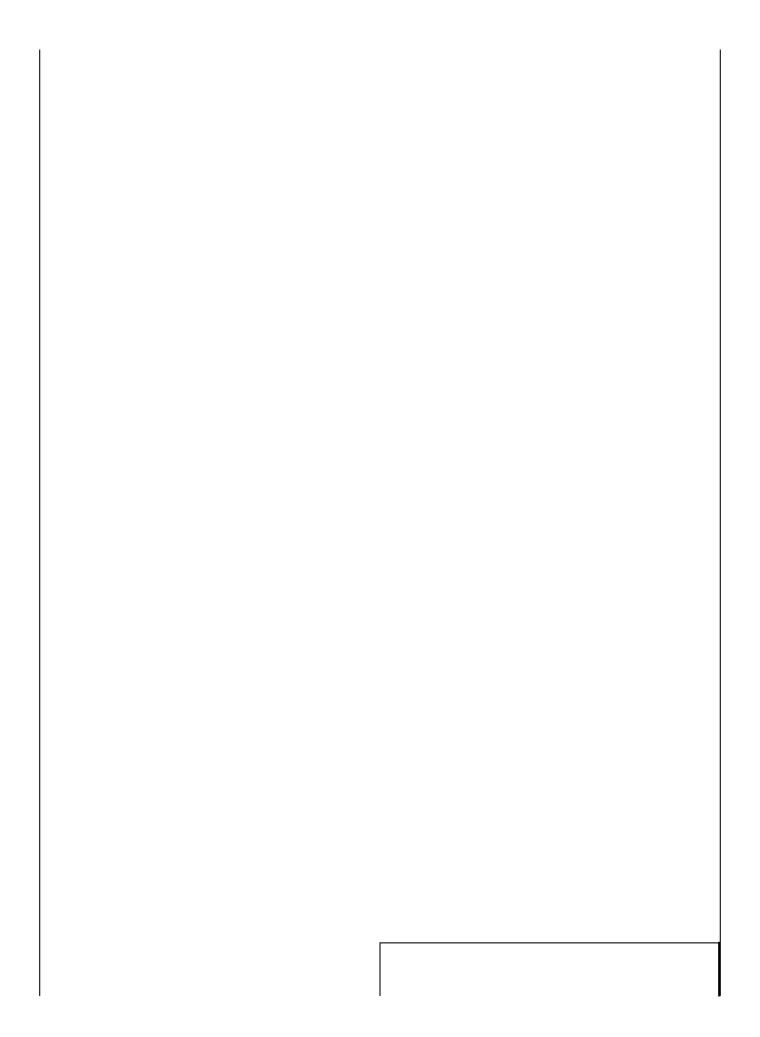
A Uf_]b[ Wf]hYf]U	\$!(-I : @	) \$ ! * ) I	*) · · +(1 · · · · · · · · · · · · · · · · · · ·	+) · · ·, (1 8	2', )   < 8
	Ü	9	Zcfa UMYX gYbMybWg'UbX dUfU[fUd\g"	YI YW IJcb" 7 cbg]ghYbh UWUXYa ]Wk f]IJb[ glmiY UbX k Y`` glfi Wi fYX gYbhYbWrg UbX dUfU[ fUd\g"	j cWUVi `Ufmi gYX k \YfY Uddfcdf]UhY" < ][ \`mYZZYWnj Y UWUXYa ]Wk f]hjb[ ghm`Yžk ]h\ WYUf UbX Wcbg]ghYbh `]b_g hc Uf[ i a Ybhg" 5 i b]ei Y Vi h Uddfcdf]UhY dfYgYbhUhjcb cZ k cf_"
bWjb[ f%\$i Ł	Wcbg]ghYbW]Y g`]b fYZYfYbW]b[ UbX#cf	, ,	gmghYa cZ fYZYfYbWJb[k]h\	UVWV fUHYŽ Vvcbg]ghYbh'UbX	Wcbj Ybh]cbg

### 5 hmy b X Ub Wy F Yei ] f Ya Yb hg

Ghi XYbhgʻUfYʻYl dYWYXʻhcʻVYʻfY[i`UfYbX'di bWi U``]bʻUhYbXUbWʻUhU```WUggYgʻ]bʻh\Yʻa cXYʻ]bʻk\]W\ʻh\Ym UfYʻYbfc``YX"'5```Udd`]WUhjcbgʻZcf`Yl Ya dhjcbʻZca `UhHYbXUbWʻcf`hc`W\Ub[Yʻh\Yʻa cXYʻcZUhHYbXUbWʻcZUbm\_]bXʻfY''["ž'ZUWYʻhcʻZUWYʻcf`cb`]bYŁa i ghVYʻa UXY`]bʻk f]hjb[ 'hcʻh\Yʻ7 ci fgYʻ5i h\cf]hm'

5 'ghi XYbhik \c'UhhYbXg``Ygg'h\Ub'Y][\midYf`WYbhicZh\Y'WUggYg'k]h\]b'U'Wci fgY'a Um'VY'fYZ gYX'Z]bU`UggYgga Ybh''Nci 'UfY'fYgdcbg]V'Y'Zcf'\_YYd]b['hfUW\_'cZmci f'UhhYbXUbWY'UbX'WcbhUWf]b['mci f'Wci fgY Wcbj Ybcf']a a YX]UhY`mi]Zmci 'UfY'WcbWYfbYX'UVci himci f'UhhYbXUbWY'fYWcfX'UbX']hg']a dUWicb'mci f'UV]`]hm hc'Wca d'YhY'mci f'Wci fgY'gi WWYggZ\``m'

91 d`UbUhjcbg`cZUVgYbW'g`Zfca `WUggYg`cf`fYei Yghg`Zcf`dYfa ]gg]cb`hc`VY`UVgYbhZfca `Zcfh\Wca ]b[ 'WUggYg



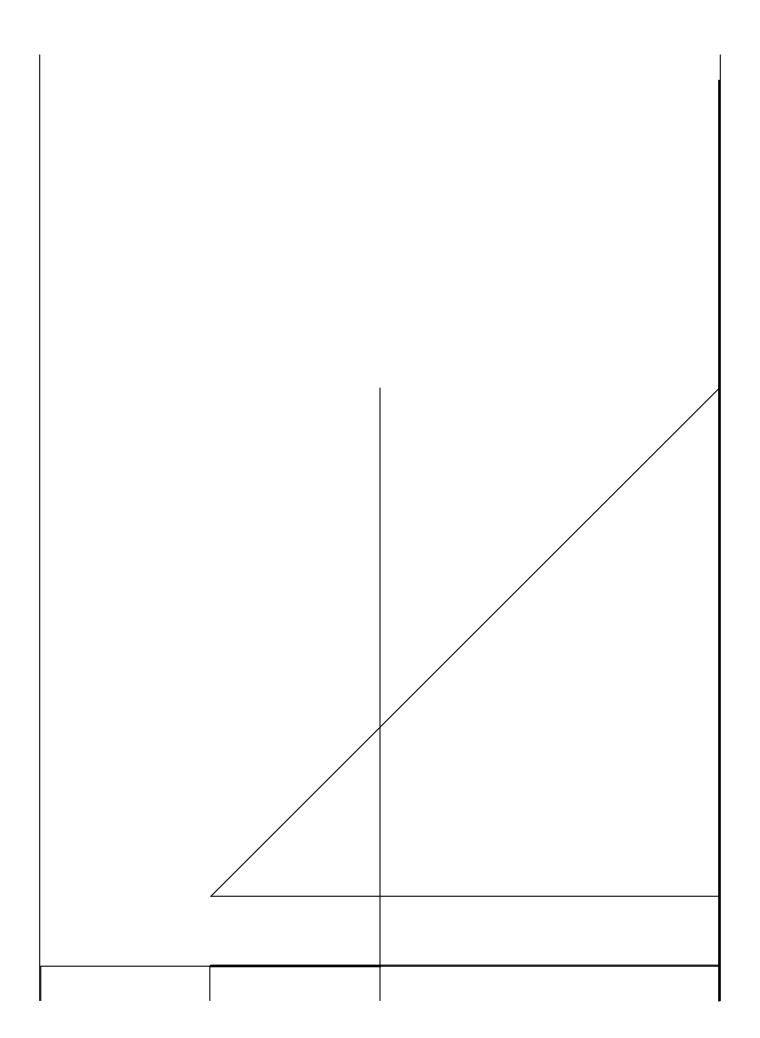
#### J]g]cb Zcf h\Y Z h fY3

H\]g'k YY 'k ]``'dfcj ]XY'U'\]ghcf]WU``UbX WcbhYa dcfUfm`cc\_Uhgi ghU]bUV`Y`XYj Y`cda Ybh [cu'q'UbX'\][\`][\h\_Ymdf]cf]hYq'Zcf']bhYfbUhcbU` XY; Y`cda Ybhdc`]WYg"'H\Y'G8; g'k YfY'a YUbhhc VY h\Y Vc`Xži ]g]cbUfmgi WWggcfcZh\Y A ]``Ybb]i a 8YjY`cda Ybh; cU`g`fA 8; gŁžk\]WX`k Ug`Wf]h]W]gYX Zcf``UW]b[']b'WcbWfYhY']a d`UbhUh]cb'UbX'[i]XYg" K ]h\ &' %]bX]\Whcfgžh\Y G8; g`]g`a YUbhhc`VY`U V`i Ydf]bhZcf'[`cVU`'gi ghJ]bUV`Y'XYj Y`cda YbhUbX hc "YZhbc cbY VY\]bX" 6i h 11 gh\ck a i W ]bZi YbWY Xc h\Y G8; g \Uj Y ]b h\Y gdUWY cZ ]bh/fbUhcbU`XYjY`cdaYbhdc`]WYg3'K ]h\. '&\$' \$ 5 [YbXU Zcf Gi ghJ]bUV Y 8 Yj Y cda Ybh Ygg h\Ub hyb myufq uk umžh lq k yy k y k j Y Ua lby G8; q Wcblf]Vi hcbg hc XYj Y`cda Ybhdc`]WYqž']hq Wf]h]Wq UbX'k \UhWUb'VY'XcbY'hc'Ybgi fY'h\Y'j ]g]cb']g'cb hfUW\_"'±b'Xc]b['gcžkY'k]``X]gW gg'gcaY'cZh\Y Ya Yf[]b['UbX'YI]qhb['XYVUhYq'h\Uh'UfY'Wf]h\WU`Zcf ]bhYfbUhcbU`XYjY`cda Ybhdc`]Wha U Yfg'hc WcbhYa d'UhY3'5 [U]b'ci f'ZcW g'k ]``VY'hc'X]qW qq k\Yh\Yfž\ck'UbX'k\mG8; g'gYfj]b['fcf'bch qYfj ]b[ Łh\Y dccfYghUbX X]qUXj UbHJ[ YX Wcaaib]hayqi]biXYiYicd]b[iWcibhf]Yq"

### ; fci d'5Wfj]m

; fci d'a Ya VYfg'k cf\_hc[Yh\Yf']b'h\Y XYj Y`cda YbhUbX'g\Uf]b[ 'cZU'; fci d'DfYgYbhUh]cb q`]XYq`cb`h\Y`hcd]WUVcj Y"`H\Y`dfYqYbhUhcb ]bWi XYg U Vf]YZ]blfcXi Wjcb cZh\Y hYUa a Ya VYfg Zfghž·Zc``ck YX`Vm'U```a Ya VYfg`g\Uf]b[ 'h\Y dfygybhuhcb ]b Wugg" H\Y Xi fuhcb cZh\Y dfygybhuhcbilgiyl dywhyx hc vy uvci hi&s a lbi hygž Zc``ck YX`VmU`E / 5`X]qW qq]cb`cZUVci h'\\$ a jbi hyg"'C by XUmUZhyf'h y dfygybhuhcb XUmžcby cZh\Y`[fci d'a Ya VYfg'k]``i d`cUX'h\Y dfYgYbHJhcb Dck YfDc]bhg`]XYg hc h\Y Wti fgY'g A ccX`Y`g]hY"; fci d a Ya VYfg`UfY`U`gc YbWcifU[YX'hc'a U\_Y'gca Y']bhYfYgh]b['dcghg']b'h\Y WeifgY'g'AccX'Y'g|hY'fk |h\|b'h\Y'8 |gW gg|cb : cfi a khc ]b]h]UhY Z fh\Yf X]gW gg]cbg cb h\Y hcd]W 5 Zc`XYf'k]``VY`WfYUhYX`]b`h\Y`WcifqY'q`AccX`Y g]hY hc i d`cUX mci f'dfYgYbhUh]cb g`]XYg" D`YUgY bchYnhUhrh\]g^[fcid'UggYggaYbhrHJg^]g'cbY Wca dcbYbhcZh\Y'[fcid'k cf\_žk]h\'%\$i 'k Y][\h''

			8i Y'Zcf'i d`cUX]b[ 'h\Y'dfYgYbhUh]cb g`]XYg.'%") - da ž'>i bY'%* 'fdYbU'hm'Udd`]Yg'Zcf'`UhY gi Va ]gg]cbt"
K YY_'(>i bY	"&\$">i bY"!"&(	GYa ]bUf	K YY_^(_`fbi_bY`&&Ł Di_V`]WDUfh]W]dUh]cb`UbX`8Yj_Y`cda_Ybh'Dc`]Wh k \c`dUfh]W]dUhYgžk \c`dfcZ]hg3
			Di V`]WdUffjWjdUfjcb`]g`]a dcffUbhZcf`XYj Y`cd]b[ UbX`]a d`Ya Ybfjb[ 'XYj Y`cda Ybhdc`]WjYg`Vi hi]g cZfYb`ZJ]`]b[ 'Vcf\ '`cWJ``Wca a i b]fjYg`UbX`f\Y Ybj ]fcba Ybf''; `cVU``nž'f\Y'ei Ygfjcb`cZ\ck '`cWJ` Wca a i b]fjYg`cf[ Ub]gY`UbX`k cf_'YZZYWfj Y`mfc XY`]j Yf`gcWjU``UbX`Ybj ]fcba YbfU``VYbYZjfg`fYa U]bg



	Www.lb[Y'UXUdruhcb'UbX']bhYfbUhcbU`XYjY`cdaYbhXYVUhYž\][\`][\h]b['h\Y'W ffYbhW]aUhY'W\Ub[YUbX'XYjY`cdaYbh]ggiYg'UZYWhb['h\Y'WUdUW]mmUbX'kY`!VY]b['cZ`cWJ`'Wcaaib]hYg']b'5ighfU`]UUbX'XYjY`cd]b['Wcibhf]Yg"'H\Y'gYa]bUf'k]`Yld`cfY'eiYgh]cbg'giW'Ug`\ck'UbX'k\mW]aUhY]adUWg'UbX'UXUdhUhcb'UWf]cbg'UfY']bYj]hUV`m`cWJ`/WJb'`cWJ`'UXUdhUhcb'dfUWfWg'hc'W]aUhYW\Ub[Y'b'VY'UggiaYX'hc'cWWf']b'U'ZJf'UbXYei]hUVY'kUmz'UbX'k\UndUh\kUmg'h\YfY'UfY'Zcf]bhY[fUh]b['W]aUhY'UbX'XYjY`cdaYbhdc`]W]Yg"
; fci d'5Wjj]hm	9 c fa cvdv_RZ _ Sj 9 c fa (, 43@9 > 367 : Hcd]WBi fhi f]b[ "cwv" [ cj Yfba Ybh YuXYfg\]d. 7 ]a UhY WX Ub[ Y 'UXUdhUh]cb 'dc `]WJYg ]b 6Ub[ `UXYg\ ' ; fci d a Ya VYfg k cf_ 'rc[ Yh\Yf ]b 'h\Y XYj Y`cda YbhUbX g\Uf]b[ 'cZU'; fci d 'DfYgYbhUh]cb g]XYg 'cb 'h\Y 'rcd]WUVcj Y" H\Y 'dfYgYbhUh]cb ]bWi XYg 'U Yf]YZ]bHcXi WJcb 'cZh\Y 'hYUa 'a Ya VYfg ZJfghz Zc ``ck YX 'VmU`` a Ya VYfg g\Uf]b[ 'h\Y dfYgYbhUh]cb ]b WUgg" H\Y 'Xi fUh]cb 'cZh\Y dfYgYbhUh]cb ]g YI dYWhYX 'rc 'VY 'UVci h&\$ 'a ]bi hYgž Zc ``ck YX 'VmU E / 5 X]gW gg]cb 'cZUVci h%\$ a ]bi hYg" C bY XUmUZhYf'h\Y dfYgYbhUh]cb 'XUmz cbY cZh\Y [ fci d a Ya VYfg k ]``i d`cUX h\Y dfYgYbhUh]cb 'Dck YfDc]bhg']XYg 'rc 'h\Y 'Wti fgY'g A ccXY g]hY'"; fci d a Ya VYfg'UfY 'U'gc Ybwti fU[ YX 'rc a U_Y 'gca Y ']bhYfYgh]b[ 'dcghg']b 'h\Y Wti fgY'g A ccXY 'g]hY 'fk ]h\]b 'h\Y '8 ]gW gg]cb : cfi a E'rc ]b]hJUhY 'Z ffh\Yf X]gW gg]cbg 'cb 'h\Y 'rcd]W 5 'Zc 'XYf'k ]`` 'VY 'WYYUhYX']b 'h\Y 'Wti fgY'g A ccX'Y

	'. 'H\fYY'Wf]h]WU``]XYUg#h\Ycf]Yg``YUfbYX'Zfca 'h\Y Wci fgYfg`gYa ]bUf & 'Hk c`]ggi Yg'h\Ym\Uj Y'Yb'cmYX'k cf_]b[`]b'h\Y [fci d'k cf_ % '6i fb]b[ 'ei Ygh]cb'h\Uhh\Ymk ]``Z fh\Yf'k cf_']b h\Y]f'ghi X]Yg'UbX'k cf_"'` 5ZhYf'h\Y'[fci d'fYZYWh]cbžYUW\'[fci d'k]``g\UfY'U gi a a UfmcZh\Y]f'X]gW gg]cbž\][\`][\h]b['h\Y Wcbhf]Vi h]cb'a UXY'Vmh\Y'Wci fgY']b'h\Y]f'cj YfU`` 'YUfb]b['ci fbYm''
5ggYgga Ybh	F YgYUfVX 'DUdYf. 'A i ghVY 'gi Va ]hhYX 'Y 'YWfcb]WU``m cb`mž'h\fci [\'h\Y'fY`Yj UbhUggYgga YbhHi fb+hb dcfhU``]b'A ccX`Y"

# Fygci fWyg

## DfYgWf]VYX F Ygci fWYg

5 ```h\Y`k YY\_`mfYUX]b[g'UbX'gYa]bUf'g`]XYg'k]```VY`Uj U]`UV'Y'Zfca 'h\Y`Wti fgYfg'A ccX`Y'g]hY''`

K YY\_'%fbi bY`%: ```=bhfcXi Wh]cb` '=bhYfbUh]cbU`'8Yj Y`cda Ybh'Dc`]WmZcf'U'a cfY'>i gh'K cf`X



#### $\label{eq:K-YY_--fbi} $$ \m_{+}$ $$ : cfY][b'5]X']b'< i a Ub]HJf]Ub'Dc']WmUbX'DfUW]WW. i bdUW_]b['X]gUgHYf'dc']HJWg3' $$$

- Gi [[YghYX`fYUX]b[.; i bUk UfXYbUž`5"`UbX`6U`UbXž`>"`f&\$%\* Łž`HUf[Yh]b[`8]gUghYf`5]X`]b`Dcgh Hgi bUa]`Gf]`@Ub\_Už`6VgV]`a^V\_e `]Zij VgZVh ž`' (f&Ł`%+-!%)"

 $DY``]b[\breve{z}A "`UbX`8]`\breve{z}? "`f&$\%${\breve{z}8}gUghYf`dc`]h]Wg. 'h]dd]b[`dc]bhg`Zcf`W.Ub[Y`]b`h\Y`UXUdhUh]cb`cZgcW]c!dc`]h]WU``fY[]a Yg<math>\breve{z}$  c` XcVdd Z:  $f \land R$ \_ 9 V` XcRaYj  $\breve{z}$ ' ( f%L '&%' +"

#### K YY "% f5i [i gh' Ł K fUdd]b[ I d. F YZfUa ]b[ +bHYfbUh]cbU "8Yj Y`cda YbhDc`]Wh3

• CdYb^fYUX]b[~UbX^fYZYW]j Y^h\]b\_]b[~dfUW]WY^Vm'U``"

### FYWca a YbXYX FYgci fW/g

⊋mci 'UfY'j Yfm\_YYb'hc'Yl d`cfY'Z fh\Yf'cb']bhYfbUh]cbU`'XYj Y`cda Ybhdc`]Whžmci 'a ][\hk Ubhhc'W\YW\_'h\Y `]ghcZ]bhYfYgh]b[ 'Ufh]WYg#Vcc\_g'VY`ck 'hc'[Yhmci fgY`ZghUfhYX"'

6ck Yb 'Gž'Nk ] '5" 'f&\$\$) Ł'DUh\k Umg'hc 'Yj ]XYb` ž' b\_]b[ 'd. 'I d.Y

; Yc[fUd\]WF YgYUfW\ž'3S`cZXZ\_R]a`]ZTj VdVRcTY 5`\_d`ceZf^ ;\_eVc\_ReZ \_R]'&\$\$+.'% \$!% - "

A cggYž8"'f&\$\$) Ł"'7i `hjj Uhjb[ '8Yj Y`cda Ybh'5b'9h\bc[ fUd\mcZ5]X'Dc`]WhiUbX'DfUWf)WY"'BYk '8Y`\]ž J ]ghUUf'Di V`]WUhjcbg"

 $C \wedge U\check{z} < "\check{z}G \setminus fYgh \setminus U\check{z}? "`?" \check{z}G \setminus VYX]\check{z}M'\check{z}G \setminus V\check{z}F "\check{z}B i VYf[\check{z}="\check{z}' < Ymc \&c \check{z}'6" \check{z}'7 YXUa cb\check{z}'9" \check{z}'HUa Ub[\check{z}'G"\check{z}'] \\ DUi XY`\check{z}? "\check{z}F][[\check{z}>"\check{z}A U``U\check{z}M'' \nearrow A WA Ubi g\check{z}D"`f&$%+k\check{z}'5[f]W``hi fU```UbX`i bXYfi hj`]gUhjcb`]b`h\Y'\]``g`cZ BYdU`. <math>\bullet$ bj Yghj[Uhjb[ 'gcWjc!Ybj ]fcba YbHU``dUh\k Umg`cZW.Ub[Yž<` fc\_R]` W fcR]  $\bullet$ f UZ/džj c`"') '  $\check{z}$  dd"%) \*!%+&"

D]YfgcbžD"'f&\$\$) Ł"'"H\Y'gh XmcZdc']WnXYj Y`cda Ybh''"'>ci fbU`'cZdc']Wn\]ghcfm%+f\$%L'' (!) %"

Dc\`zi7"'f&\$\$, Ł"'": fca 'gWjYbWY'hc'dc`]Wmh\fci [\'hfUbgX]gWjd`]bUfmfYgYUfW\""'Ybj ]fcba YbH\``gWjYbWY'/dc`]Wm\%fWL'(\*!)'"

### 7ci fgY 9j U'i Uhcb UbX 8Yj Y'cda Ybh

7 cbgłfi Włj Y ZYYXVUW\_]g [ fYUhmUddfYWJUhYX"K Y U]a 'hc 'Wcbłjbi Y 'hc ]a dfcj Y 'UbX'i dXUhY 'h\Y 'Wci fgY/d`Um gca Y 'dUfh]b '\Y`d]b[ i g 'hc 'Xc 'gc"'G\UfY 'mci f 'ZYYXVUW\_ž 'mci f 'fYgci fWrgž 'mci f ']XYUg"'D`UmU'dUfh]b ZUW]]lUłjb[ 't\Y 'YUfb]b[ 'cZU``a Ya VYfg cZh\Y 'WUgg"

Gi Va ]gg]cb cZ5ggYgga YbhHUg\_g

# 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