



ENGG2400

A YWUb]Wg`cZGc`Xg`%

HYfa `Hk c`#`&\$&%

GWcc`cZ7 Jj J`UbX`9bj Jfcba YbHJ`9b[]bYYf]b[`#`I BGK `9b[]bYYf]b[



7ci fgY`Cj Yfj]Yk

GhJZ`7cbhJW`8YhJ]`g

7cbj Ybcfg

B Ua Y	9a U]	5j U]UV]]m	@cW]h]cb	D\cbY
8Uj]X`?Y`Yfa Ubb	X"_Y`Yfa Ubb4 i bgk "YXi "Ui	Dcgh]b`h\Y`HYUa g 7\UbbY`g`Zcf [YbYfU`ei Ygh]cbgž UbX`Zcf`dYfgcbU` ei Yf]Yg`a YggU[Y a Y`&(#`cb`HYUa g i g]b[`7\Uf	F cca `&\$, >ž 5]bgk cfn`6`X[-',) `+&' '

GW\cc`7cbhJW`hZcfa Uh]cb

@YUfb]b[`Ci hMca Y	95 `GHJ[Y`%7ca dYhYbWYg

5ggYgga Ybh

5ggYgga YbhHUg_g

5ggYgga YbhHUg_g	K Y][\h	8i Y'8UH	Gh XYbh@YUfb]b[Ci hWta Yg'5ggYggYX
K YY_`mHUg_g`	%-l	K YY_`m	' ž'(ž) ž*
6`cW_`HYghg`	&+l	K YY_g'(ž+ž%\$`H\i fg`*da	&ž' ž'(ž) ž*
@UVg`	% l	K YY_) `UbX`K YY_`-	' ž'(ž) ž*
:]bU`9l Ua]bU]cb`	' *l	GYY`9l Ua `H]a YHUV`Y	' ž'(ž) ž*

5ggYgga Ybh8YHJ]`g

5ggYgga Ybh%`K YY_`mHUg_g

@Yb[h. `%k YY_`

8YHJ]`g.

DGG`< UbX!]bg`UbX`k YY_`mei]n"

5ggYgga YbhW]hYf]U`Zcf`Z ``a Uf_g`]b`DGG`\UbX!]bg`]g`cb`mi`h`Uhmci `a U_Y`U`fYUgcbUV`Y`UH`Ya`dh]b`mci`f`ck`b`\UbX`k`f]h]b[`Zcf`YUW`c`Z`h`Y`f`k`UbX!]b`f`d`f`c`V`Ya`g"

DGG`f`Y`h`f`b`Y`X`k`]h]b`]k`c`k`YY_g`"A`cc`X`Y`E`i`]n`]g`]bg`h`b`h`"\$`)"`#`%`a`Uf`_`Zcf`DGG`c`b`Y`k`YY_`UH`ž`\$`#`%`a`Uf_g`Zcf`k`c`k`YY_g`UH`"Gi`Va`]h`Ug`D8: `c`f`d`\`c`h`c`g`i`d`c`U`X`Y`X`j`]U`H`Y`U`a`g`5gg][`ba`Y`b`h`g`"H`c`h`U`-`"DGG`<`UbX`]bg`"

A`cc`X`Y`E`i`]n`a`i`gh`V`Y`X`c`b`Y`k`]h]b[`h`Y`c`b`Y`k`YY_`d`Y`f`]c`X`"A`cc`X`Y`e`i`]n`n`Y`g`k`]`V`Y`d`]b`b`Y`X`U`g`h`U`V`g`Zcf`Y`U`W`h`c`d`]W`X`U`b`b`Y`]b`H`Y`U`a`g`"H`c`h`U`-`"A`cc`X`Y`E`i`]n`n`Y`g`"

Gi`Va`]gg]c`b`b`c`h`Y`g.`Gi`Va`]h`e`i`]n`j`]U`A`cc`X`Y`E`i`]n`U`b`X`DGG`j`]U`H`Y`U`a`g`5gg][`ba`Y`b`h`g`"

Hi`fb]h]b`g`Y`h]b[.`H`]\`g`]g`b`c`h`U`"Hi`fb]h]b`U`gg][`ba`Y`b`h`g`"

5ggYgga Ybh&.`6`cW_`HYghg`

GhUfhXUH. `K YY_g'(ž+ž%\$`H\i fg)`da

@Yb[h. `()`a`]b`i`h`Y`g`ž`%`a`]b`g`h`W`k`Vi`Z`Y`f`ž`%`a`]b`i`h`Y`g`W`b`U`b`X`i`d`c`U`X`h`a`Y`g`"

8YHJ]`g.

H`Y`Y`6`c`W`_`H`Y`g`h`W`c`j`Y`f]b[`h`Y`Y`e`i`Y`g`h`c`b`g`Y`U`W`ž`c`b`Y`Zcf`Y`U`W`c`Z`h`Y`k`YY_`m`h`c`d`]W`ž`h`Y`g`h`U`_`Y`b`c`b`]b`Y`j`]U`H`Y`U`a`g`"

5ggYgga YbhW]hYf]U`Zcf`Z ``a Uf_g`]b`W`i`X`Y`g`W`c`f`Y`W`h`U`b`X`W`Y`U`f`a`U`h`Y`a`U`h]W`i`k`c`f_]b[`ž`f`Y`U`g`c`b]b[`U`b`X`X`]U`f`U`a`g`h`c`g`i`d`d`c`f`h`h`Y`W`c`f`Y`W`h`b`i`a`Y`f]W`i`U`b`g`k`Y`f`"

6`cW_`hYghXi fUhc b`lg`(`) `a]bi hYg`bca]bU`md`i g`%) `a]bi hYg`Vi ZYf`Zcf`hYVXb]WU`]ggi Yg`UbX`hYb`%) `a]bg
i d`cUX`hja Y`UZf`Z]bU`Ubkg Yf`fYgdcbgYg`Uj Y`WcgYX" H\YfY`UfY`bc`U`hY`V`cW_`hYghz`U`hYfbUhj] Y`hja Yg
UbX`bc`gi dd`Ya YbhUfmV`cW_`hYghg"GdYW]U`Wcbg]XYfU]cbg`k]`cb`mcZYf`Zcf`hY`k Y][`h]b[`hc`VY`UXXYX`hc
hY`Z]bU`YI Ua "

A Uf_g`k]`VY`fYh fbYX`k]h]b`h`fY`k YY_g"

5XX]h]cbU`XYHJ]`g.

7 f]h]f]U`

Gi Va]gg]cb`bchYg.

F Ygci fWg

DfYgWf]VYX`F Ygci fWg`

HYI hWcc_."A YWUb]Wg`cZA UHf]U'g. HYbh`9X]hcb`]b`G=I b]hg"!`F 7`< JVVY`YfZ`DYUfgcb`9Xi W]hcb"

I BGK `@]VfUfmk YVg]H. `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]WcgcZiHYUa g. `hhdg.##YUa g"a]WcgcZiWca `

F YWca a YbXYX`F Ygci fWg

C hYf`fYgci fWg`UfY`dfcj]XYX`X][]U`mi`Mci `a UmVWccgY`hc`[YhUXX]hcbU`hYI hWcc_g"

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

H\Y` : UW`hmcZ9b[]bYYf]b[`Yj U`i UH`g`YUW`Wci fgY`YUW`hja Y`]h]g`fi b`h`fci [`f]E`hY`A m9I dYf]YbW`
Gi fj YmgZ`UbX`f]]E` : cW`g` ; fci d`A YYh]b[g" `5g`dUfhcZ`hY`A m9I dYf]YbW`dfcW`ggZ`mci f`gh`XYbhYj U`i Uh]cbg
cb]j Uf]ci g`UgdYWg`cZ`hY`Wci fgY`UfY`[fUXYX`/h`Y`7ci fgY`7ccfX]bU`rf`dfYdUfYg`U`gi a a UfmfYdcfhZ`f`hY
<YUX`cZGW`cc""5bmdfcV`Ya `UfYUg`UfY`]XYbh]ZYX`Z`f`fYa YX]U`UW]cbZ`UbX`]XYUg`Z`f`a U_]b[
]a`dfcj Ya Ybhg`hc`hY`Wci fgY`UfY`bchYX`Z`f`UW]cb`hY`bYI h]ja Y`h`Uh`hY`Wci fgY`]g`fi b" : cW`g` ; fci d

5 WUXYa]W< cbYgImiUbX`D`U[]Uf]ga

5 WUXYa]W=Zcfa Uh]cb

=a U[Y'7 fYX]h

GmbYf[]Yg]b'Gci bX'&\$%*

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'Wc'bhYi h U`ZUW'c'fg]a dUW]b['hY Yb[]bYYf]b['X]gWd`]bY	
D9%"* 'i bXYfghUbX]b['cZhY'gWc'dY'z'df]bW]d'Yg'z'bcfa g'z'UW]c'i 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]Ya Uh]WYb[]bYYf]b['gmb'hYg]g'UbX'XYg][b'dfcW'ggYg	
D9%"('5dd`]WU]h]cb'cZgmg]Ya Uh]WUdd'fcUW]Yg'hc'hY'Wc'bx] W]UbX'a UbU[Ya YbhcZYb[]bYYf]b[dfc'YW]g	
DfcZYgg]cbU`UbX'dYfgcbU`Uhf]Vi hYg	
D9' "%9h]WU`Wc'bx] W]UbX'dfcZYgg]cbU`UW]c'i 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 Y'z']bbcj Uh]j Y'UbX'dfc!UW]j Y'XYa YUbc] f	
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`Wc'bx] W]	
D9' "*" '9ZYW]j Y'hYUa 'a Ya VYfg\]d'UbX'hYUa ``YUXYfg\]d	