



MUSC4702

DYfZcfa UbWV '@JVc fUhc fm,

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



GWcc''cZH Y'5ftg'UbX'A YXJU''# 'I BGK ''5ftg'UbX'GcWJU''GWYbWg

5 WUXYa JWbZcfa Uhcb`

: cfYggYbhU`ghi XYbh]bZcfa Uhcb`fY`Uh]b[`hc. fYei Yghg`Zcf`YI hYbg]cb/fYj]Yk `cZa Uf_g/cVW dUh]cbU``YU`h
UbX`gUZ`m/YI Ua]bUh]cb`dfcW`Xi fYg/gdYW]U`Wcbg]XYfUh]cb`]b`hY`Yj Ybhcz]`bYgg`cf`a]gUXj Ybhi fY/
ghi XYbhYei]mUbX`X]gUV]`]m`UbX`ch`Yf`YggYbh]U``UWUXYa]W]bZcfa Uhcbž
gYY`[\frdg.##k k "Ufrg"i bgk "YXi "Ui #W ffYbh\]ghi XYbh\]#UWUXYa \]W\]bZcfa Uhcb#dfc`hcWc`gl`i \]XY`\]bYg#](#)

7ci fgY'8YHJ]`g

7fYX]hDc]bhr`*`

Gi a a UfmicZ\Y'7ci fgY

Gi VYWh5fYU.`? ge[U

⊕`h]g`Z]bU`Wci fgY`cZ\Y`DYfZcfa UbW`@UVcfUhc fmgYei YbW`žmci `k]`ghfYb[h\Yb`UbX`XYa cbghfUHY`mci f
dYfZcfa Uhj`Y`g_]`g]b'a i g]W`a U_]b[`VmXYj`Y`cd]b[`UbX`dfYgYbH]b[`U`dYfZcfa UbW`dfc`YWhfY`Uhj`Y`hc`mci f
W`cgYb`ghfYUa ž`bUa`Y`miA i g]WDYXU[c[nž`Gcb]W5f`g`cf`A i g]W`c[m`K`cf`g`cdg`UbX`gYa]bUfg`k]`
gi ddcfh`h`Y`dfYdUfU]cb`cZdfc`YWh`UbX`ZcW`g`cb`W`b`h`I`h`U`]ggi`Yg`]b`dYfZcfa UbW`dfYgYbH]cb`"Mci`k]`
U`gc`dUfh]WdUHY`]b`Ub`Uddfcj`YX`I`BGK`YbgYa`V`Y`UbX`hU`_`Y`U`YUXYfg\]d`fc`Y`Ug`Uddfcdf]UHY`"``

5h\Y`W`bWi`g]cb`cZ\]g`Wci fgY`h`Y`gh`XYbh`k]`VY`UV`Y`hc

%`5dd`miUXj`UbW`X`g_]`g]b'a i g]W`dYfZcfa UbW`YI`YW`h]cb`UbX`dfYgYbH]cb`"

5ggYgga Ybh

D`YUgY`gYY`A ccX`Y`Zc`f`a cFY`XYHJ`g`"5`gcZ`UggYgga YbhHUG_gZ`XYHJ`g`c`Za U`cf`dfc`YWgZ`XUH`g`UbX`c`h`Yf`fY`Yj`Ybh`]bZ`fa`UH`cb`k`j`"VY`X]gW`ggYX`]b`h`Y`Z]fgh`WUgg`c`Z`h`Y`g`Ya`Ygh`Yf`"

5ggYgga YbhHUG_g`

5ggYgga YbhHUG_	K`Y`[`\`h`	8i`Y`8UH`	Gh`XYbh`@YUfb`]b`[`C`i`h`W`a`Yg`5ggYggYX`
H\`fY`fYdc`f`g`f`\$`	`\$i`	Bch5dd`]WUV`Y`	B`#5`
DYfZc`fa`UbW`d`f`c`Y`W`f`\$`)`\$i`	Bch5dd`]WUV`Y`	B`#5`
9bgYa`V`Y`d`U`f`h`W`d`U`h`c`b`f`&`\$`	&`\$i`	Bch5dd`]WUV`Y`	B`#5`

5ggYgga Ybh8YHJ`g`

5ggYgga Ybh%`H\`fY`fYdc`f`g`f`\$`

GhUfhXUH`. `Bch5dd`]WUV`Y`

8YHJ`g`. `H\`fY`fYdc`f`g`c`Z`%`\$`\$`k`c`f`X`g`Y`U`W`k`j`"Xc`W`a`Ybh`U`g`d`Y`W`g`c`Z`g`h`X`m`U`b`X`d`f`Y`d`U`f`U`h`c`b`h`c`k`U`f`X`g`h`Y`Z`b`U`d`f`Y`g`Y`b`h`U`h`c`b`z`Y`b`[`U`[`Ya`Y`b`h`k`]`h`k`c`f`_`c`Z`d`Y`Y`f`g`U`b`X`a`U`h`f`j`U`d`f`Y`g`Y`b`h`X`]`b`g`Ya`]`b`U`f`g`"K`f`]`h`Y`b`Z`Y`X`V`U`W`Z`f`c`a`"Y`W`h`f`Y`f`"

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

H\]g`UggYgga YbhW`a`dcbYbh]g`gi`V`Y`W`h`c`W`U`b`[`Y`c`f`a`c`X`]Z`W`h`c`b`"A`c`f`Y`X`Y`H`J`g`k`j`"V`Y`d`c`g`h`X`c`b`A`c`c`X`Y`U`b`X`X`]g`W`gg`Y`X`]b`W`U`g`g`]b`X`i`Y`W`c`i`f`g`Y`"

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

5ggYgga Ybh&.`DYfZc`fa`UbW`d`f`c`Y`W`f`\$`

GhUfhXUH`. `Bch5dd`]WUV`Y`

8YHJ`g`. `M`c`i`k`j`"V`Y`f`Y`e`i`]f`Y`X`h`c`d`f`Y`g`Y`b`h`U`g`c`c`c`f`[`f`c`i`d`d`Y`f`Z`c`fa`UbW`c`Z`&`!`\$`a`]b`i`h`Y`g`]b`X`i`f`U`h`c`b`h`U`h`g`l`c`k`W`U`g`Y`g`U`V`]`h]Y`g`]b`a`i`g`]W`a`U`_]b`[`U`b`X`#`f`d`Y`f`Z`c`fa`UbW`!`f`Y`U`h`X`g`_]`g`"H`Y`d`Y`f`Z`c`fa`UbW`a`U`m`h`U`_`Y`h`Y`Z`c`fa`c`Z`U`g`c`c`d`Y`f`Z`c`fa`UbW`Z`U`[`f`c`i`d`c`f`W`c`"U`V`c`f`U`h`]`Y`d`Y`f`Z`c`fa`UbW`Z`Y`W`h`f`Y`f`Y`W`h`U`c`f`U`b`U`d`d`f`c`d`f`]U`h`d`Y`f`Z`c`fa`U`h`]`Y`Y`j`Y`b`h`U`d`d`f`c`j`Y`X`V`m`h`Y`W`c`i`f`g`Y`W`c`b`j`Y`b`c`f`"H`Y`d`Y`f`Z`c`fa`UbW`k`j`"V`Y`d`f`Y`g`Y`b`h`X`U`g`U`b`Y`i`U`a`]b`U`h`c`b`"K`f`]`h`Y`b`f`Y`d`c`f`h`Z`f`c`a`"Y`i`U`a`]b`Y`f`"

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

H\]g`UggYgga YbhW`a`dcbYbh]g`gi`V`Y`W`h`c`W`U`b`[`Y`c`f`a`c`X`]Z`W`h`c`b`z`W`c`b`h]b`[`Y`b`h`c`b`h`Y`W`Y`U`h`j`Y`d`f`c`Y`W`g`g`h`X`Y`b`t`g`k`]g`l`c`i`b`X`Y`f`U`_`Y`]b`h`l`g`W`c`i`f`g`Y`"H\]g`k`j`"V`Y`U`X`X`f`Y`g`g`Y`X`]b`h`Y`Z`]f`g`h`g`Ya`]b`U`f`c`Z`h`Y`W`c`i`f`g`Y`"

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

5ggYgga Ybh'`. `9bgYa`V`Y`d`U`f`h`W`d`U`h`c`b`f`&`\$`

GhUfhXUHY. 'Bch5dd`]WV`Y

8YhU]`g. 'DUfhWXYW_]b['hYghcb`a i g]W]`a UHYf]U`gh X]YX`UbX`dYfZcfa YX`]b`Ub`Uddfcj YX`I BGK `YbgYa V`Y
Xi f]b['h`Y`gYgg]cb" 'H\]g`]g`h`Y`Z]bU`UggYgga YbhZcf`h`Y`Wci fgY" '8]fYVhZYXVUW_]Zca `X]fYWcf`h`fci [\ci h
h`Y`gYgg]cb`UbX`X]fYVhZYXVUW_]cb`h`Y`dUfhWXYW_]b['hYgh`

Gi Va]gg]cb'cZ5ggYgga YbhHUg_g

Gh XYbng'UFY'YI dYWX'hc'di hH'Y'f'buA Yg'UbX'ghi XYbhbi a VYfg'cb'Yj YfmdU[Y'cZ'HY]f'Ugg][ba Ybng"

Hi fb]hb'Gi Va]gg]cb

Zmci 'YbWci bHY'U'dfcV'Ya 'k \Yb'UHYa dh]b['hc'gi Va]hrci f'Ugg][ba Ybh'fci [\ 'Hi fb]hb'z'd'YUgY
HY'Yd\cbY'9I HYfbU'Gi ddcf'hc'b'-' ,) ' ' ' %cf'Ya U]'hYa 'cb'[YI HYfbU'HY'f'gi ddcf'f4 i bgk "YXi "Ui "](#)Gi ddcf'h
\ci fg'UFY' , .\$\$Ua '-'%. \$\$da 'cb'k YY_XUmg'UbX'-. \$\$Ua '-') . \$\$da 'cb'k YY_YbXg'f'l *) 'XUmg'U'mYUf'Zmci
UFY' i bUV'Y'hc'gi Va]hrci f'Ugg][ba YbhXi Y'hc'U'ZU' 'hk]h'Hi fb]hb'rci 'a UmUdd'm'Zcf'Ub'YI HYbg]cb'z'Vi hrci
a i ghfY'U]b'rci f'h]W_Yhbi a VYf'Zca '9I HYfbU'Gi ddcf'h'U'cb['k]h'Ubmc'h'Y'f'f'Y'j Ubh'Xc'W a Ybng'k'hc
]b'Wi XY'Ug'Yj]XYb'W'hc'gi ddcf'hrci f'YI HYbg]cb'Udd']W]h'cb'" Zmci 'Ya U]'9I HYfbU'Gi ddcf'hrci 'k]'
Ui 'hca U]h'W' 'm'f'Y'W'j Y'U'h]W_Yhbi a VYf'z'Vi h]Zmci 'HY'Yd\cb'Y'mci 'k]' 'b'Y'X'hc'gd'Y'W'Z'W' 'm'Ug'_Zcf'cb'Y"
Hi fb]hb'U'gc'd'f'c]]XYg'i dXU'Y'g'cb'h'Y]f'g'm'g'h'Ya 'g'h'U'h'g'cb'Hk]h'Y'f'"

; YbYfU'm'z'UggYgga YbhHUg_g'a i ghVY'gi Va]h'Y'X'Y'Y'W'f'cb]W' 'mj]U'Y]h'Y'f'Hi fb]hb'cf'U'A ccX'Y
Ugg][ba Ybh' 'b]bg'h'Ub'W'g'k \Y'f'Y'h']g']g' b'chid'cgg]V'Y'Z'hk]' 'VY'g'f'U'Y'X'cb'mci f'W'ci fg'Y'g'A ccX'Y'g]h'Y'k]h'
U'h'f'U'h]j Y'gi Va]gg]cb'XY'U]g"

@UH'5ggYgga YbhDYbU'h]Yg

Gh XYbng'UFY'f'Yg'd'cbg]V'Y'Zcf'h'Y'gi Va]gg]cb'cZUggYgga YbhHUg_g'Vmi'h'Y'f'Yei]f'Y'X'XU'Y'g'UbX'h'a Yg'
8Yd'YbX]b['cZ'HY'YI HY'h'bcZXY'Um]b'h'Y'gi Va]gg]cb'cZUb'UggYgga YbhHUg_g'dUgh'h'Y'Xi Y'XU'Y'UbX'h'a Yz
cb'Y'cZ'HY'Z' 'ck]b['UH' 'd'Yb'U'h]Y'g'k]' 'Udd'mi b'Ygg'gd'Y'W'U' 'W'cbg]XY'f'U'h'cb'cf'U'V'Ub_Y'h'YI HYbg]cb'Xi Y'hc'U
HY'W'b]W' 'ci]U[Y']g['f'Ub'h'Y'X'": cf'h'Y' 'di f'd'c'g'Y'c'Z'U'Y' 'd'Yb'U' 'm'W'W' 'U'h]cb'z'U' 'X'U'm']g'XY'Ya YX'hc'VY'YU'W'X
&(!\ci f'd'Y'f]c'X'f'c'f'd'U'f'h'Y'f'Y'c'Z'd'U'gh'h'Y'g'h]di 'UH'Y'X'XY'UX']b'Y'Zcf'gi Va]gg]cb"

- K cf_'gi Va]h'Y'X' 'Ygg'h'Ub'%'\$'XUmg'U'Z'h'f'h'Y'g'h]di 'UH'Y'X'XY'UX']b'Y']g'gi V'Y'W'h'c'U'XY'Xi W]cb'c'Z
) i 'cZ'HY'hc'U'Uk Uf'X'U'V'Y'a Uf_'Zca 'h'Y'a Uf_'h'U'hk ci 'X'\Uj Y'V'Y'Y'b'U'W'X]Yj YX']Z'b'ch'Zcf'h'Y
d'Yb'U' 'm'Zcf'Yj Yfm'X'U'm'd'U'gh'h'Y'g'h]di 'UH'Y'X'XY'UX']b'Y'Zcf'gi Va]gg]cb" H\U'h]g'z'U'gh'XY'bhk '\c'gi Va]hg
Ub'Ugg][ba Ybhk]h'U'g'h]di 'UH'Y'X'XY'UX']b'Y'c'Z(. \$\$da 'cb'%' 'A Um'&\$\$* 'Uh(. \$\$da 'cb'%' 'A Um'&\$\$*
k]']b'W'f'U'XY'Xi W]cb'c'Z%'\$'i "

HUg_'k]h'U'bc'b d'Y'f'W'b'U] [Y'a Uf_

Z'h'Y' 'HUg_']g'a Uf_Y'X'ci hc'Z&) z'h'Y'b'UH' 'gi Va]gg]cb'k]' 'U'h'f'U'W'h'U'd'Yb'U' 'm'c'Z'U'XY'Xi W]cb'c'Z%'&) 'Zca 'h'Y
a Uf_'Uk Uf'Y'X'hc'h'Y'g'h'XY'bh'Zcf'Yj Yfm'&(!\ci f'd'Y'f]c'X'f'c'f'd'U'f'h'Y'f'Y'c'Z'd'U'gh'h'Y'g'h]di 'UH'Y'X'XY'UX']b'Y"

- K cf_gi Va]hYX %\$'hc %- 'XUmg 'UZhf'h'Y'gh]di 'UhYX'XYUX`]bY'k]''VY'UggYggYX'UbX'ZYXVUW_dfcj]YXX'Vi hU'a Uf_cZnYfc'k]''VY'fYWcfYXX''Z'hY'k cf_k ci 'X'\Uj Y'fYW]j YX'U'dUgg'a Uf_Vi hZcf hY''UhY'bYgg'UbX'hY'k cf_]g'U'Wta di `gcfmWci fgY'Wta dcbYbhfli fX'Y'fYei]fYa YbHžU'ghi XYbhk]''VY'XYYa YX'hc'\Uj Y'a Yh'hUhfYei]fYa Ybh'
- K cf_gi Va]hYX &\$'cfa cfY'XUmg 'UZhf'h'Y'gh]di 'UhYX'XYUX`]bY'k]''bchVY'UWW'dhYX'Zcf UggYgga YbhUbX'k]''fYW]j Y'bc'ZYXVUW_ž'a Uf_cf[fUXY''Z'hY'UggYgga YbhUg_]g'U'Wta di `gcfm Wta dcbYbhcZ'hY'Wci fgY'U'ghi XYbhk]''fYW]j Y'Ub'l bgUhgZUWcfm: U]'fl : Ł'[fUXY'Ug'U'fYgi `hcZ i bgUhgZUWcfmdYfZcfa UbVW`]b'Ub'YggYbh]U'Wta dcbYbhcZ'hY'Wci fgY''

H\]g`]bZcfa Uhcb`]g'U'gc'Uj U]UV'Y'Uh

[\hdg.##k k k "Ufng"i bgk "YXi "Ui #W ffYbHghi XYbmg#JWJXYa \]W\]bZcfa Uhcb#dfchWc`g!\[i \]XY`\]bYg#](#)

5 WUXYa]W<c bYghmUbX`D`U[]Uf]ga

D`U[]Uf]ga `]g`i g]b[`hY`k cfXg`cf]XYUg`cZchYfg`UbX`dfYgYbh]b[`hYa `Ug`mci f`ck b" `hWUb`hU`Y`a Ubm
Zcfa gZ`Zca `XY`]VYfUHY`WXYU]b[`hc`UWV]XYbhU`mW`dm]b[`Zca `U`gci fW`k]hCi hUW_bck`YX[Ya Ybh`

I BGK `[fci dg`d`U[]Uf]ga `]bhc`hY`Zc`ck]b[`WUHY[cf]Yg.

7 cdm]b[.`i g]b[`hY`gUa Y`cf`j Yfmg]a]Uf`k cfXg`hc`hY`cf][]bU`hYI hcf`]XYU`k]hCi hUW_bck`YX[]b[`hY
gci fW`cf`i g]b[`ei chU]cb`a Uf_g" `H\]g`U`gc`Udd`]Yg`hc`]a U[YgZ`UfhUbX`XYg][b`dfc`YWgZ`Ug`k Y`Ug
dfYgYbhU]cbg`k \YfY`gca YcbY`dfYgYbh]g`UbchYf`g`]XYUg`cf`k cfXg`k]hCi hWYX]h`

hUddfcdf]UHY`dUfUd`fUg]b[.`7`Ub[]b[`U`ZYk `k cfXg`UbX`d`fUgYg`k \]Y`a cghmifYU]b]b[`hY`cf][]bU`
ghfi W`i fY`UbX`#`f`dfc[fYgg]cb`cZ]XYUg`cZ`hY`cf][]bU`Z`UbX`]bZcfa U]cb`k]hCi hUW_bck`YX[Ya Ybh`H\]g`U`gc
Udd`]Yg`]b`dfYgYbhU]cbg`k \YfY`gca YcbY`dUfUd`fUgYg`UbchYf`g`]XYUg`cf`k cfXg`k]hCi hWYX]hUbX`hc
d]YW]b[`hc[YhYf`ei chYg`UbX`dUfUd`fUgYg`]bhc`U`bYk `k \c`Yz`k]hCi hUddfcdf]UHY`fYZYfYbW]b["

7 c`i g]cb. `k cf_]b[`k]h`chYfg`Vi hdUgg]b[`cZ`hY`k cf_]Ug`U`dYfgcb`g`]bX]j]Xi U`k cf_"`7 c`i g]cb`U`gc

- i bXYfghUbx'mci f'f][\hg'UbX'fYgdcbg]V]]hYg'Ug'U'gh XYbhUhl BGK
- VY'Uk UfY'cZd'U[]Uf]ga ž'Wcdmf][\hžI BGK 'Gh XYbh7cXY'cZ7cbXi WñUbX'5WwdfUV'Y'I gY'cZ I BGK '⇒H'F Ygci fW'g'Dc`]Wñ
- VY'Uk UfY'cZñY'ghUbXUfXg'cZVY\Uj]ci f'YI dYWñX'cZYj Yfmcby']b'hY'I BGK 'Wca a i b]m
- `cWñh'gYfj]Wg'UbX']bZcfa Uhcb'UVci hl BGK 'UbX'I BGK '@VfUfm

Gca Y'cZñYgY'UfYUg'k]`VY'ZJa]]Uf'hc'mci žcñYfg'k]`VY'byk "; U]b]b['U'gc`X'i bXYfghUbx]b['cZU`ñY fY'UH'X'UgdYWñ'cZ9@G9'k]`Y'd'mci 'a U_Y'hY'a cghcZmci f'gh X]Yg'Uhl BGK "

[f\hd.#gi.VYWf\[i\]XYg"\]VfUfm'i bgk "YXi "Ui #'\]gY#UVci h' \]gYŁ](#)

F Ygci fWg

DfYgWf]VYX`F Ygci fWg`

H\YgY`k]``VY`dcghYX`cb`A ccX`Y"

F YWca a YbXYX`F Ygci fWg

H\YgY`k]``VY`dcghYX`cb`A ccX`Y"

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

H\]g`k]``VY`UXXfYggYX`]b`h\Y`Z]fghgYa]bUf`cZh\Y`Wci fgY"

⇒ U[Y`7 fYX]h

6cX]Yg/` `bhfZJWg`&\$%*

7F ⇒CG

7F ⇒CG`Dfcj]XYf`7cXY.`\$\$\$- , ;