

GhUV`YWŁ]b!9a]gg]c b`j YfnY]WŁ bYhY`]a `YhnhYb`>J\ f`Y]b`XYi h`]WŁ Yg`K UWŁ ghi a` 5`hWŁ]bg

5`g`X]Y`? fmdhc!5ggYhg`]a` `YhnhYb`>J\ f`]a` a` Ybg`Ub`K` Yfh
[`Yk`UbbYbž`gh]Y[` `Ui`WŁ`XUg`K`UWŁ`ghi`a` `XYf`GhUV`YWŁ]b!
K`]fhgWŁ`UZh`i`bX`\Yi`hY`g]bX`GhUV`YWŁ]bg`]a` `K`Yfh`j`c b`%+\$ž&(
A`j``UfXYb`I`G!8c``Uf`]a` `I`a` `Ui`Z`'8]Y`8UhYb`nY][`Ybž`XUgg`]b
XYb` `YhnhYb`%&`A`c bUhYb`Y]bY`FY]\Y`j`c b`GhUV`YWŁ]b!
6Yk`Yfhi`b[`Yb`YI`dcbYbh]Y``[`Ygh]Y[`Yb`g]bX``%&!A`c bUhg!
GhUh]gh]_Yb`nY][`Ybž`XUgg`X]Y`GhUV`YWŁ]b!A`Uf`_hVYk`Yfhi`b[`Yb
Y]b`a`Ugg]j`Yg`K`UWŁ`ghi`a` `j`YfnY]WŁ`bYhYb` `a` `j`Yf[`Ub[`YbYb
>J\ f`YffY]WŁ`hYb`nU`\fY]WŁ`Y`? fmdhc!5ggYhg`5``nY]h`c`WŁ
fB`H<`ł!DfY]gYž`XU`U`_hi`Y``Y`8`UhYb`XUg`g][`b]Z]_Ub`hY`K`UWŁ`ghi`a
XYf`? fmdhc!K`]fhgWŁ`UZh`]a` `>J\ f`&\$&%`i`b`hY`fghfY]WŁ`Yb``8`UfØVYf
\]bUi`g`\UVYb`:`]Uh[`YVi`bXYbY`Hc`_Ybž`X]Y`U``[`Ya`Y]b`U`g
GhUV`YWŁ]bg`VYnY]WŁ`bYh`k`YfXYbž`Ui`WŁ`U`g`nYbhfU`]g]YfhY
J`Yfk`U`\fYf`i`bX`XYnYbhfU`]g]YfhY]b`a`Ugg]j`Yg`K`UWŁ`ghi`a
j`YfnY]WŁ`bYh`Dfc`hc`_c``Y`\UVYb`gY]h` `YhnhY`a` `>J\ f`A`j``UfXYb
/`Ua`d^Y``]d/

5`g`X]Y`? fmdhc!5ggYhg`]a` ``YhnhYb`'ſ\`f`]a` a` Ybg`Ub`K` Yfh
[`Yk` Ub`bYb`ž`gh]Y[` `Ui` W`X`Ug`K` UW`ghi` a` `XYf`GhUV`YW`]b!
K`]fhgW`UZhi` bX` `Yi` hY`g]bX`GhUV`YW`]bg`]a` `K` Yfh`j` cb
%+`\$`ž`&(` `A`]` ``UfXYb`'I` G!8c``Uf`]a` `i` a` `Ui` Z``8]Y`8UhYb`nY][` Ybž
XUgg`]b`XYb` ``YhnhYb`' %&`A` cbUhYb`Y]bY`FY]\`Y`j` cb
GhUV`YW`]b!6Yk` Yfhi` b[` Yb`YI` dcbYbh]Y``[` Ygh]Y[` Yb`g]bX"

%&!A` cbUhg!GhUh]gh]_Yb`nY][` Ybž`XUgg`X]Y
GhUV`YW`]b!A` Uf`_hVYk` Yfhi` b[` Yb`Y]b`a` Ugg]j` Yg
K` UW`ghi` a` `j` YfnY]W`bYhYb

⇒a` `j` Yf[` Ub[` YbYb`'ſ\`f`YffY]W`hYb`nU`\`fY]W`Y`? fmdhc!5ggYhg
5``nY]h\`cW` `fB`H<`!`DfY]gYž`XU`U`_hi` Y``Y`8UhYb`XUg`g][` b]Z`_UbhY
K` UW`ghi` a` `XYf`? fmdhc!K`]fhgW`UZhi]a` `ſ\`f`&`\$`%`i` bhYfghfY]W`Yb"
8UfØVYf`\`]bUi` g`\UVYb`':`]Uh![` YVi` bXYbY`Hc`_Ybž`X]Y`U``[` Ya` Y]b`U`g
GhUV`YW`]bg`VYnY]W`bYh`k` YfXYbž`Ui` W`U`g`nYbhfU`]g]YfhY
J`Yfk` U`\fYf`i` bX`XYnYbhfU`]g]Yfh`Y]b`a` Ugg]j` Yg`K` UW`ghi` a`
j` YfnY]W`bYh`Dfchc`_c``Y`\UVYb`gY]h``YhnhYa` `ſ\`f`A`]``UfXYb`j` cb
Hc`_Yb`Ui` g[` Y[` YVYb"

Hcd!HYb!GhUV`YW`]bg`bUW`A` Uf`_hVYk` Yfhi` b[` `[` Ya` À»
W`]b[` YW`_c`"W`a` !A` Yhf]_Yb`Ua` `%%`"ſ\`bi` Uf`&`\$`&`"

5a` `%%`"ſ\`bi` Uf`&`\$`&`k` YfXYb`VY]gd]Y`gk` Y]gY`X]Y`<` U`hYgY]`Y
fI` **G8H**Ł`8]Y`A` Uf`_h`Ud]hU`]g]Yfi` b[` VYhfi` [` `&(` ž(` `A`]``UfXYb`'I` G!
8c``Uf`i` bX`]gh`gY]h``YhnhYa` `ſ\`f`i` a` `&`%`ž` `%i` ` [` Ygh]Y[` Yb``I` G
8c``Uf`W`]b`fI` G87Ł`ž`XYf`nk` Y]h[` fØ»` hY`GhUV`YW`]b!J`Yfa` Ò[` Ybgk` Yfh
]b`6Yni` [` `Ui` Z`X]Y`A` Uf`_hVYk` Yfhi` b[` ž`\UhY`Ua` `gY`VYb`HU[` `XYg
`YhnhYb`'ſ\`fYg`Y]bY`A` Uf`_h`Ud]hU`]g]Yfi` b[` `j` cb`(` ž(` `A`]``UfXYb`'I` G!
8c``Uf``<`Yi` hY`VYhfÀ[` h`X]Y`A` Uf`_h`Ud]hU`]g]Yfi` b[` `j` cb`I` G87`(` `ž`
A`]``UfXYb`'I` G!8c``Uf`ž`k` Ug`Y]bYa` `5bgh]Y[` `j` cb`;` -` +`ž`&`i`
Ybhgd]f]W`h"

8Yf`j` cb`6]bUbW`fB!` G8Ł`Ui` g[` Y[` YVYbY`GhUV`YW`]b`\`UhY`j` cf
Y]bYa` `ſ\`f`bi` f`Y]bY`A` Uf`_h`Ud]hU`]g]Yfi` b[` `j` cb`%`A`]``UfXY`'I` G!

8c`Uf'i bX`]gh`Yhnh%(`A]`UfXYb`l G!8c`Ufž`k Ug`ja `j Yf[Ub[YbYb
`U\`f`i a `%" \$`\$`i `[Ygh]Y[Yb`]gh`HYffUg`GhUV`YWc]b`l GH`\UhhY`Ua
%%"`Ubi Uf`&\$`&%`Y]bY`A Uf_h`VYk Yfhi b[`j cb`% , `A]`cbYb`l G!
8c`Ufž`i bX`\`Yi hY`VYhfÅ[h`X]Y`A Uf_h`Ud]hU`]g]Yfi b[`%\$ž)
A]`UfXYb`l G!8c`Uf`

...

⇒a ``YhnhYb`>`U\`f`gh]Y[Yb`X]Y
A Uf_h`Ud]hU`]g]Yfi b[Yb`j cb` :]Uh!
[YVi bXYbYb`Hc`_Yb`\`Ò\`Yf`U`g`X]Y`a`Y]ghYb
? fmdhc!; Yk]bbY

8Yf`85`Hc`_Yb`j cb`A U`_YfXUc`gh]Y[`j cb`%ž` `A]`UfXYb`l G!8c`Uf
Ui Z`\`Yi hY`- `A]`UfXYb`l G!8c`Ufž`XU`Yf`ja ``YhnhYb`>`U\`f`i a `) - &ž` \$
i `[Yk UW`gYb`]gh`A` A ž`Ui W`_VY`_Ubb`h`U`g`A U[]W`b`hYfbYh`A cbYmž
]gh`Y]b`GhUV`YWc]bž`XYf`bcW`b]W`h`Y]ba U`Y]b`>`U\`f`U`h`]ghž`UVYf`XYf
gYW`gh[fÒ`» hY`GhUV`YWc]bž`XYf`Yi]gh]Yfh`

A` A` VY[Ub`b`a`]h`GYdhYa` VYf`&\$`&%`a`]h`XYf`9a`]gg]cb`a`]h`) ž(
A]`cbYb`l G!8c`Uf`i bX`\`Yi hY`VYhfÅ[h`X]Y`A Uf_h`Ud]hU`]g]Yfi b[
j cb`A` A` (ž` `A]`UfXYb`l G!8c`Uf`" 8UfØVYf`\]bUi g`\Uh`XYf
GhUV`YWc]b` : fUl`fi F5L`Ě`XYfnY]h`Y]bY`A Uf_h`Ud]hU`]g]Yfi b[`j cb`&
A]`UfXYb`l G!8c`Ufž`UVYf`YhnhYg`>`U\`f`k UfYb`Yg`bi f`- &`A]`cbYb
l G!8c`Uf`

8Yf`K` Yfh`U`Yf`\`Yi hY`Yi]gh]YfYbXYb`GhUV`YWc]bg`f%+\$`A]`UfXYb
l G!8c`UfĚ`a` UW`h`, ž&(i`XYf`[YgUa` hYb`? fmdhc!K`]fhgW`UZh`Ui`g`
8Ug`<UbXY`gj`c`i`a` Yb`j`cb`GhUV`YWc]b`a` UW`h`\`Yi hY`a` Y`f`U`g`*`%`i
XYg`k`Y`hk`Y]hYb`<UbXY`gj`c`i`a` Ybg`j`cb`ØVYf`%&`\$`\$`\$`? fmdhc!5ggYhg
Ui`g`

A Ub`_Ub`b`a`]h`G]W`Yf\`Y]h`gU[Ybž`XUgg`VY]`Y]b][Yb`XYf`8c`Uf!
[YVi bXYbYb`Hc`_Yb!A Uf_h`Ud]hU`]g]Yfi b[Ybž`X]Y`ja ``YhnhYb`>`U\`f`
Y]b`]a` a` YbgYg`K` UW`ghi`a` `j`YfnY]W`bYhYbž`]fY
A Uf_h`Ud]hU`]g]Yfi b[g[Yk]bbY`ghÅ`_Yf`[Ygh]Y[Yb`g]bX`U`g`X]Y
; Yk]bbY`hfUX]h]cbY`Yf`? fmdhc!5ggYhg`k`]Y`6]hWc]b`icXYf`9h`YfYi`a` "

8 YfnY]hifYdfÅgYbh]YfYb`GhUV`YWŁ]bg`, ž&(i `XYf`[YgUa hYb`? fmdhc!
K]fhgWŁUZh`a `K Yfhj cb`\\Yi hY`Yhk Ug`a Y\\f`U`g`&`6`)]cbYb`I G!
8c``Uf``8 Ug`[`cVU`Y`<UbXY`gj c`i a Yb`j cb`GhUV`YWŁ]b`VYhfi [`]b
XYb`YhnhYb`&(`Ghi bXYb`fi bX`+&ž`A `)]UfXYb`I G!8c``Ufž`k Ug
*%ž- (i `XYg`\\Yi h][Yb`J c`i a Ybg`j cb`%%+ž&`A `)]UfXYb`I G!8c``Uf
]b`XYf`[YgUa hYb`? fmdhc!K]fhgWŁUZh`Ybhgd]WŁh"

K Ug`\\U`hYb`G]Y`j cb`XYb`GhUV`YWŁ]b!
A Uf_h_Ud]hU`g]Yfi b[Ybž`X]Y`]a `YhnhYb`>U\\f`i a `) \$\$`i `Ui Z
%"" \$\$`i `[Ygh]Y[Yb`g]bX3`HY`Yb`G]Y`i bg`=\\fY`A Y]bi b[`ni
X]YgYa `H\\Ya U`]b`XYb`?ca a YbhUfYb`i bhYb`a]h`"

ΔJa]Y`FYXa Ub`

ΔJa]Y`FYXa Ub`]gh`BYk g`@YUX`VY]`6]hWŁ]b`WŁa `BYk g`i bX`Y]b`]b`:`cf]XU`YVYbXYf
:]bUbnhYWŁ!&i fbU`]gh`FYXa Ub`]gh`gY]h`&\$%%`U`_h] Yg`A]h[`]YX`XYf`? fmdhcK Å\\fi b[g!
7ca a i b]hm`9f`\\Uh`Y]bY`@Y]XYbgWŁUZh`Z0f`6]hWŁ]bž`CdYb!Gci fWŁ!7cXY`i bX`XYnYbhfU`Y
5bk YbXi b[Yb`"GY]h`GYdhYa VYf`&\$%) `\\Uh`FYXa Ub`a Y\\f`U`g`) "\$\$\$`5fh]_Y`Z0f
6]hWŁ]b`WŁa `BYk g`0VYf`X]Y`\\Yi hY`Ui Z_ca a YbXYb`X]gfi dh] Yb`Dfchc_c`Y
[YgWŁf]YVYb"

6]`XbUWk Y]gY. `G\i hhYfgbcW_ž'D]l UVUmž'K]_]`7ca a cbgž
7c]b[YW_cž'HfUX]b[j]Yk ž`

K Y]hYfY `VY`]YVhY `B UWk f]Wk hYb

: U`g`8i `Yg`j YfdUggh`\Ugh

f[bWh]cbfXž'gž]XŁ'oj Uf`gž'Z'g'1 `X"[Yh9`Ya Ybhg6mHU[BUa YfbŁQ\$Q
]ZfK"[Yh9`Ya Ybh6m=Xf]XŁŁ'fYhi fb/'g'1 `X"WfYUhY9`Ya YbhfgŁ/'g"]X'1
]X/'g"gfWl "`\hhdg.##AŁbbYWh"ZUWVcc_"bYh#bSl G#gX_"^g. l ZVa `1 %/
j Yfg]cb1 j ' "&"/Z'g"dUfYbhBcXY"]bgYfh6Y ZcfYf'gž'Z'gŁ/'qfKcW a Ybhž
fgWf]dhfž'fZUWVcc_! ^ggX_fŁŁ/

8YhU]`g

6Ygi Wk Yb `G]Y `i bg`Ui Z. ` _fmdhc!bYk g"Uh