



MECH4620

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("`H\Y`UV])hmc`]bYfdYhWca di fU]cbU`fYgi `rg`UbX`hc`k`f]h`U fYdcfhWcbj Ym]b[`hY`fYgi `rg`cZ`hY`Wca di fU]cbU`UbU`mg]g"	D9' "%žD9' "" žD9' "*

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dfc YW]c`YbWci fU[Y`Wc`UVcfU]j Y`YUfb]b['YI dYf]YbWg"5`gcžXYa cbgfU]c'fg'UfY`bck`fYei]fYX`hc
dfcj]XY`a cfY`Wca dfY\Ybg]j Y`ZYXVUW_]cb`Ugg][ba YbhUW]j]]Yg`Xi f]b[``UV`gYgg]cbg"

Gi Va]gg]cb'cZ5ggYgga YbhiHUg_g

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GWkcc'Wcj Yf'g\YYH'

5`gi Va]gg]cbg'UfY'YI dYVWYX'hc'VY'bYUhiUbX'WYUfmgYhici H'Mci f'fYgi 'hg'UfY'h\Y'd]bbUWY'cZU`mci f'\UfX
k cf_'UbX'g\ci 'X'VY'hYUhiX'k]h'Xi Y'fYgdYVW'DfYgYbh]b['fYgi 'hg'WYUfm[]j Yg'h\Y'a Uf_Yf'h\Y'VYghWUbxW
cZi bXYfgUbx]b['mci f'a Yh\cX/Yj Yb']Zh\Y'bi a Yf]WU'fYgi 'hg'UfY']bVc'ffYVW'

A Uf_]b['[i]XY']bYg'Zcf'Ugg][ba Ybhigi Va]gg]cbg'k]`VY'dfcj]XYX'Uhih\Y'gUa Y'h]a Y'Ug'Ugg][ba YbhXYH]g
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gi VYVWih'U'`UHY'dYbU'micZ&\$'dYfW'bhf&\$i 'E'cZh\Y'a U[]a i a 'a Uf_'dcgg]V'Y'Zcf'hUhiUggYgga Ybh]hYa ž
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UggYgga Ybh]g'c] YfXi Y'"H\YfY']g'bc'dfc!fUHU'cZh\Y'`UHY'dYbU'miZcf'gi Va]gg]cbg'a UXY'dUfhk Umih\ci ['\U
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K cf_gi Va]hYX'UZfY'h\Y'XYUX']bY'Zcf'UVgc'i hY'ZU]']g'bchUWVW'dhYX'UbX'U'a Uf_'cZnYfc'k]`VY'Uk UfXYX
Zcf'hUhiUggYgga Ybh]hYa "

: cf'gca Y'UggYgga Ybh]hYa gžU'`UHY'dYbU'mia UmibchVY'Uddfcdf]UHY'"H\YgY'UfY'WYUfm]bX]WUhiX'']b'h\Y
Wci fgY'ci h]bYž'UbX'gi W'UggYgga Ybhg'fYVW']j Y'U'a Uf_'cZnYfc']ZbchWca d'YhYX'Vmih\Y'gdYVW]ZYX'XUHY"
9I Ua d'Yg']bWi XY.

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&" C b']bY'ei]nnYg'k \YfY'Ubgk Yfg'UfY'fY'YUgYX'hc'gfi XYbhg'cb'Wca d'Yh]cbž'cf
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7 cbg]XYfUhc'b"

: cf'XYHU]g'cZUdd'm]b['Zcf'GdYWU'7 cbg]XYfUhc'b'UbX'W]bX]h]cbg'Zcf'hY'Uk UfX'cZgi dd'Ya YbhUfm
UggYgga Ybhž'd'YUg'gYY'hY'j]bZcfa Uhc'b'cb'I BGK 'g'[GdYWU'7 cbg\]XYfUhc'b'dU\]Y"](#)

D'YUgY'bc'hY'hUhighi XYbhg'k]'bchVY'fYei]fYX'rc'dfcj]XY'UbmXcW a YbhUfmYj]XYbW'rc
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5 WUXYa]W< cbYgmiUbX`D`U[]Uf]ga

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D`U[]Uf]ga`]g`U`hmdY`cZ]bhY`YW`i`U`h`YZ`i`#iW]b`hU`_Y`a`UbmiZcfa`gZ`Zca`XY`]VYfUHX`WX`YU]b[`hc`UWUXYbH`U`m`
W`dm]b[`Zca`U`gci`fW`k`]h`ci`hUW`bck`YX[`Ya`Ybh`I`BGK` `Ug`dfcXi`WX`U`k`YVg]h`k`]h`U`k`YU`h`cZ`
fYgci`fW`g`hc`gi`ddcfghi`XYbhg`hc`i`bXYfgHbX`UbX`Uj`c]X`d`U[]Uf]ga`z`j`]g]h`[gh`XYbh`i`bgk`"YXi`"Ui`#d`U\[\]Uf\]ga`"](#)
H`Y`@YUfb]b[`7`YbhY`Ugg]ghg`gh`XYbhg`k`]h`i`bXYfgHbX]b[`UWUXYa]W]bhY[f]m]UbX`ck`bchlc`d`U[]Uf]gY`
H`Y`miU`gc`lc`X`k`cf_g`l`cdg`UbX`W]b`Y`d`gh`XYbhg`cbY!cb!cbY"

Mci`UfY`U`gc`fYa`]bXYX`h`UhWUfYZ`h`a`Y`a`UbU[`Ya`Ybh]g`Ub`ja`dcfHbhdUfhcZghi`XmiUbX`cbY`cZ`h`Y`
]XYbh]ZYX`W]i`gYg`cZ`d`U[]Uf]ga`]g`d`ccf`h`a`Y`a`UbU[`Ya`Ybh`G`h`XYbhg`g`l`ci`X`U`ck`gi`Z]W]Ybh]h`a`Y`Z`c`f`
fYgYUfW`Z`X`fU`Z]b[`UbX`h`Y`dfcdYf`fY`Z`fY`bW]b[`cZ`gci`fW`g`]b`dfY`dUf]b[`U`UggYgga`Ybh]Ug_g"

Z`d`U[]Uf]ga`]g`Z`ci`bX`]b`mci`f`k`cf`_`k`Y`b`mci`UfY`]b`Z]fghmYUfZ`mci`f`YW`i`fYf`k`]`c`ZYf`mci`Ugg]ghU`bW`hc`
]a`dfcj`Y`mci`f`UWUXYa]Wg_]`g`"H`Y`ma`UmUg`_`mci`hc`cc`_`Uhgca`Y`cb`]bY`fYgci`fW`gZ`U`hY`bX`h`Y`@YUfb]b[`
7`YbhY`Z`cf`gca`Y`h`a`Yg`fYgi`Va`]h`mci`f`k`cf`_`k`]h`h`Y`dfcV`Ya`Z]`YX`"<ck`Yj`Yf`a`cfY`gYf]ci`g`]bgHbW`g`]b`Z]fgh`
mYUfZ`gi`W`Ug`gh`U`]b[`UbchYf`gh`XYbhg`k`cf`_`cf`dU]b[`gca`YcbY`hc`Xc`mci`f`k`cf`_`za`UmVY`]bj`Ygh[`UH`X`
i`bXYf`h`Y`G`h`XYbhA`]gW`bXi`W`h`DfcW`Xi`fYg"

F`YdYUHX`d`U[]Uf]ga`fYj`Yb`]b`Z]fghmYUfZ`d`U[]Uf]ga`UZYf`Z]fghmYUfZ`cf`gYf]ci`g`]bgHbW`gZ`a`UmU`gc`VY`
]bj`Ygh[`UH`X`i`bXYf`h`Y`G`h`XYbhA`]gW`bXi`W`h`DfcW`Xi`fYg`"H`Y`dYbU`h`Yg`i`bXYf`h`Y`dfcW`Xi`fYg`W]b`]bW`i`XY`
U`fYXi`W]cb`]b`a`Uf_gZ`Z]b[`U`W`i`fgY`cf`Zc`f`h`Y`a`cghgYf]ci`g`a`UH`Y`fg`f]l`_Y`d`U[]Uf]ga`]b`Ub`l`cbci`fg`
h`Y`g]g`L`Yj`Yb`gi`gdYbg]cb`Zca`h`Y`i`b]`Yfg]m`H`Y`G`h`XYbhA`]gW`bXi`W`h`DfcW`Xi`fYg`UfY`Uj`U]UV`Y`Y`fY`.

[k`k`k`"\[g`i`bgk`"YXi`"Ui`#d`U\[\]Uf\]ga`\]W\]bhY`gh`XYbhA`\]gW`bXi`W`h`DfcW`Xi`fYg`dXZ`](#)

5 WUXYa]W=Zcfa Uh]cb

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7 ci fgY`WYX]hg`W`W`UH`X`]b`I` b]hg!C Z 7 fYX]hfl C 7 E`H`Y`bcfa U`k cf`cUX`YI dYWUh]cb`Zf`cbY`I C 7

