GMAT4220

; YcgdUhjU``=bZcfaUhjcb'GWjYbWY



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7 ci fgY⁻Cj Yfj]Yk

GHJZZ7cbHJWhi8YHJ]`g

7cbj Ybcfg

BUa Y	9a U]`	5j U]`UV]`]hm	@cWUh]cb	D∖cbY
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GWXcc`7cbHJWhr=bZcfaUh]cb

<u>9b[]bYYf]b[_`Ghi XYbhGi ddcfhGYfj]WYg</u>`-'H\Y`Bi WYi g`!`Ybfc`a Ybhž`dfc[fYgg]cb`W\YW_gž`WUg\`fYei Yghgž Wci fgY`]ggi Yg`cf`dfc[fUa !fY`UhYX`ei Yf]Yg`

<u>9b[]bYYf]b[`⊕Xi ghf]U``HfU]b]b[</u>`–`⊕Xi ghf]U``HfU]b]b[`ei Ygh]cbg`

<u>I BGK 'Gh Xm5VfcUX</u>'-gh XmUVfcUX'gh XYbhYbei]f]Yg'fZcf']bVci bX'gh XYbhgŁ'

<u>IBGK '91 W.Ub[Y</u>'-'ghi XYbhYI W.Ub[Y'Ybei]f]Yg'fZcf']bVci bX'ghi XYbhgŁ'

LBGK :: i h fY'Gh XYbhg'-'dchYbh]U``gh XYbhYbei]f]Yg'Y"["'UXa]gg]cbgž'ZYYgž'dfc[fUa gž'WfYX]hhfUbgZYf'

D\cbY'

fŽ*%*&Ł-',)*,)\$\$*-BiWYig'GhiXYbh<iV*

fŽ*%`&Ł'-',)`+**%`**-**`9b[]bYYf]b[`⊕Xi gHf]U``HfU]b]b[`

fŽ*%`&Ł'-',)`'%+-`<mark>-</mark>`IBGK `GhiXm5VfcUX`UbX`IBGK `9IWXUb[Y`fZcf`]bVcibX`ghiXYbhgŁ`

7cifgY[·]8YHJ]`g

l b]hg`cZ7fYX]h`*`

Gi a a UfmcZh\Y'7ci fgY

5bU'mg]gʻcZ[YcgdUHJU''dfcV'Ya gʻ]bWi X]b['Wa dcbYbhgʻcZXUHU'UWei]g]Hjcb'UbX'XUHUVUgY'XYj Y`cda Ybhž gdUHJU''UbU'mg]gʻUbX'X]gd`Umž'UbX'W ghca]g]b['UbX'dYfZcfa]b['UXj UbWYX'UbU'mg]gʻi g]b['a UWfc''Ub[i U[Yg UbX']bHY[fUHJb['k]H\chXYf`gcZk UfY''A UbU[Ya YbhUbX']bgHih HjcbU'']ggi Ygʻ]bWi X]b['\ck 'H\Y'HYWkbc'c[m UbX'XUHU']gʻi gYX'Vmj Uf]ci gʻcf[Ub]gUHjcbg'UbX'[cj Yfba YbhXYdUfha Ybhgž'[Yc!gdUHJU'XUHU']ggi YgʻZcf [cj Yfba YbhUbX']bXi gHmž'gHUbXUfXgž'a YHUXUHUž'Y[U'']ggi YgʻUggcWJUHYX'k]H\'H\YgY'gmgH'a gž']bH''YWhi U' dfcdYfhmž'Wedmf][\hž'']UV]`]mž'dfc'YWha UbU[Ya YbhUbX']a d'Ya YbhUhjcb'cZH\YgY'gmgH'a g'''8 UHUVUgY gHi WhifYgʻUbX'XUHUVUgY'a UbU[Ya Ybh''8 UHU'cf[Ub]gUHjcb']b'fUgHYf'XUHU'gHi WhifYg'''J]gi U']gUHjcb'cZ WebHjbi ci gʻgi fZUWfg'''A YH\cXg'Zcf']bHYfdc'UHjcb''; 'cVU''dfYX]Wfjcb'i g]b['WUgg]Z]WUHjcb'a cXY'g''; 'cVU']bHYfdc'Uhjcb'' g]b['HYbX'gi fZUWfg''@cWU'XYHYfa]b]gHjWa YH\cXg'Zcf']bHYfdc'UHjcbg'Zf'gdUHJU''UbU'mg]gʻk]H\ X]gWfYHjnYX'VebHjbi ci gʻZJY'Xg''GdUHJU''UbU'mg]gʻi g]b['gei UfY'k]bXck g''GdUHJU''UddfcUWXYg'hc'Yffcf dfcdU[UHjcb']b'bi a Yf]WU'a cXY'']b['': i nnmgYhg'UbX'Z nnmcVYWfg''

7 ci fgY⁻5]a g

H\]gʻWci fgYʻU]a gʻrcʻ]błfcXi WYʻI\YʻI\YcfYljWU`WcbWYdhgʻUbXʻHYW\b]WU`df]bW]dʻYgʻI\UhbYYXʻIcʻYY i bXYfghccXʻhcʻk cf_`YZZYWIj Y`mUbX`Wf]hJWU``mk]h`; Yc[fUd\]W=bZcfa UhjcbʻGmghYa gʻfJ =G'L''Hcd]Wgʻ]bʻI\Y Wci fgY`]bWi XY`WcbWYdhgʻUbX`XYZ]b]hJcbgʻcZgdUhJU``gmghYa gž'VccfX]bUHYʻgmghYa gža Udd]b[`'UbX`gdUhJU`]ggi Ygʻk]h`a UdgžXUHUʻgfi Wi fYgʻ]bWi X]b[`'j YWrcfžfUghYfʻUbX`gi fZJWY`a cXY``]b[žWca dcbYbhgʻcZh\Y HYW\bc`c[mžXUHUVUgY`a UbU[Ya Ybh]bʻh\YWcbhYI hcZgdUhJU``XUHUžXUHUVUgY`XYg][bžXUHU`UVei]g]hJcb HYW\b]ei Ygʻ]bWi X]b[`X][]h]g]b[žgWUbb]b[žŽ]Y`Xʻgi fj YmUbX`fYa chYʻgYbg]b[žXUHU`Wcbj Yfg]cb'dfcWiggž j]gi U`]gUhJcb`cZ[YcgdUhJU``XUHUžWUffc[fUd\mžWc`ci f`UbX'' 8`j]Yk gžUbU`mg]gʻcZ[YcgdUhJU``dfcV`Ya gž gdUhJU``UbU`mg]g`UbX`X]gd`Umž`Wighca]g]b[`UbX`dYfZcfa]b[`UXj UbVWX`UbU`mg]gʻi g]b[`a UWfc``Ub[i U[Yg`UbX]bhY[fUhJb[`k]h\ch\Yf`gcZhk UfYži g]b[`h\Y`K cfX`K]XY`K YV`hc`X]ggYa]bUhY`]bZcfa Uhjcb''

7cifgY`@YUfb]b[`CiHWcaYg

5ZhYfigi VWVggZ ``mWcad`Yh]b[h\]g'WcifgYžmci ig\ci`X'VY'UV`Y'hc.

@YUfb]b['CiHWcaY	

5 HYbXUbW/FYei]fYaYbhg

Ghi XYbhgʻUfYʻghfcb[`m'YbWci fU[YX'hcʻUhhYbX'U```WUggYgʻUbX'fYj]Yk ``YWhi fYʻfYWcfX]b[g"

7 ci fgY GWX YXi `Y

J]Yk WUgg'ha YHJV'Y

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8 UhY	Hmd Y	7cbhYbh	
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K_YY% '' \$`A_Um!''	@YWhifY	=bhfcXiWnjcbihci; =GiUbXiAUdidfcYWnjcbg	
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K YY_`&.`*`>i bY`!`%\$	@YWhifY	JYW∕ncf`UbX`FUghYf	
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FYZYfYbWfg.

DUi``5"'@cb[`YmWfS29WaYdSbZ[U;`Xad_Sf[a`EkefW_eS`VEU[WUW!>c\bK]`Ym/'Gcbgz*=bW'&\$\$%

Hcf`6Yfb\UfXgYbž'9WaYdSbZ[U;`Xad_Sf[a`EkefW_e,3`;`fdaVgUf[a`F'fX`YX"ž'>c\b`K]`Ym⁄`Gcbgž'±bW" &\$\$%

Gi Va]gg]cb cZ5ggYgga YbhHUg_g

D`YUgY`fYZYf`hc`h\Y`A ccX`Y`dU[Y`cZh\Y`Wci fgY`Zcf`Z fh\Yf`[i]XUbWY`cb`UggYgga Ybhigi Va]gg]cb"

I BGK `\Ug'U'gHUbXUfX``UhY'gi Va]gg]cb'dYbU`hmcZ

)ı 'dYf'XUmž'Zcf'U``UggYgga Ybhg'k \YfY'U'dYbU'miUdd`]Ygž'WUddYX'Uh'Z]j Y'XUmg'f%&\$'\ci fgŁz'UZh'f k \]W\'U'ghi XYbh'WUbbchigi Va]hUb'UggYgga Ybhž'UbX'bc'dYfa]hhYX'j Uf]Uh]cb"

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

6Yk UfY**5b*Ugg][ba Ybhih Uhi]bWi XYg*d*U[]Uf]gYX*a UhYf]U**k]``*fYWY]jY*U*\$i **U]`ž*UbX*ghi XYbhg*k \c d*U[]Uf]gY*a UmZU]`*h\Y*Wci fgY**Ghi XYbhg*k \c*d*U[]Uf]gY*UfY*U*gc**]UV*Y*hc*X]gW]d*]bUfm*UWf]cbž]bWi X]b[YI Wi g]cb*Zfca *Ybfc*a Ybh

D`U[]Uf]ga `]g`h\Y`i gY`cZUbch\Yf`dYfgcb'g`k cf_`cf`]XYUg`Ug`]Zh\Ymk YfY`mci f`ck b"`K \Yb`]h`]g`bYWfggUfmcf XYg]fUV`Y`hc`i gY`ch\Yf`dYcd`Y'g`a UhYf]U``mci `g\ci `X`UXYei UhY`mUV_bck `YX[Y`k \cgY`k cfXg`cf`]XYUg`h\Ym UfY`UbX`k \YfY`mci `Zci bX`h\Ya `f[]j]b[`h\Y`Wca d`YhY`fYZYfYbWf`XYhU]`gž`]bWi X]b[`dU[Y`bi a VYffgL''`H\Y @YUfb]b[`7YbhfY`dfcj]XYg`Z fh\Yf`]bZcfa Uh]cb`cb`k \UhWcbgh]hi hYg`D`U[]Uf]ga `Uh

<u>\hdg.##ghi XYbh'i bgk "YXi "Ui #d`U[]Uf]ga</u>

5WUXYa]W=bZcfaUh]cb

:]bU``9I Ua]bUh]cbg.

:]bU``YI Ua g`]b`H&`&\$&&`k]``VY`\Y`X`cb`]bY`VYfk YYb`%&f\`!`&) f\`5i [i gh&\$&&`]bWi g]j Yž'UbX gi dd`Ya YbfUfm`YI Ua g`VYfk YYb`) f\`!`-f\`GYdfYa VYf`&\$&&`]bWi g]j Y"`Nci `UfY`fYei]fYX`fc`VY`Uj U]`UV`Y`cb f\YgY`XUfYg"`D`YUgY`Xc`bchfc`a U_Y`UbmdYfgcbU``cf`ffUj Y``UffUb[Ya Ybfg`Xi f]b[`f\]g`dYf]cX"`

57589A = 7 58J = 79

- ? YmGHJZhc '7 cbHJWiZcf'5WJXYa]W5Xj]WY flc[']b'k]h mci f'n=8 'UbX dUggk cfXŁ <u>\htdg.##bHJbYHWj Yb["i bgk "YXi "Ui # YmlgHJZhc!WcbHJWiXi f]b[!mci f!gh X]Yg!UHi bgk</u>
- ?Yml_BGK_8UhYg!'Y["'7Ybgi g'8UhYžYI Ua 'XUhYgž'UghXUmhc'Xfcd'U'Wci fgY'k]h\ci h UWUXYa [W#]bUbW[U'``]UV]`]hmiYhW'
- 7 J 9B 'Gh XYbh = bh UbYh flc [']b k]h 'mci f'n=8 'UbX dUggk cfXŁ '<u>hhdg.# bh UbYh Wj Yb ['i bgk "YXi "Ui #gh XYbh]bh UbYh</u>
- Ghi XYbh@]ZY Uh7 J 9 B ž]bWi X]b['Ghi XYbh
 GcW]Yh]Yg. \htdg.##k k k 'i bgk "YXi "Ui #Yb[]bYYf]b[#Mji]!UbX!Ybj]fcba YbHU`!Yb[]bYYf]b[#ghi XYbh`]ZY.
- GdYWJU``7cbg]XYfUh]cb.`<u>\htdg.##ghiXYbh'i bgk "YXi "Ui #gdYWJU`!Wcbg]XYfUh]cb</u>`
- ; YbYfU``UbX`Dfc[fUa !GdYWjZjWE i Yghjcbg. <u>'H\Y`Bi WYi g. Ghi XYbh< i V</u>`
- 6cc_'Ub`5WUXYa`]W5Xj`]g]b[gYgg]cb.`<u>\htdg.##Udd"UW`]hmgWXYXi`]b["Wca_#gWXYXi`Y"d\d3ck_bYf1%-\$&(+*)</u>

8]gWU]a Yf

FZ[e UagdeWagf'[`WeWfe agf VWeUd[bf[a` aXU'SeeWe Sf fZWVSfWfZW5 agdeWA gf'[`W[e bgT {eZWVžFZW `SfgdWaXU'SeeWe _ Sk UZS`YWVgd[`Y fZWFWd_ SXWd fZW5 agdeWA gf'[`W[e bgT {eZWVž? aaV WeZag V TW Ua` eg fWW Xad fZWgb fa VSfWU'See VWeUd[bf[a` ež ;XfZWdW[e S` k [`Ua` e[efW Uk [` fZWVWeUd[bf[a` aX SUf[h[f[We TWfi VWV fZWG` [hWde[fk f[_ WfST WS` V fZW5 agdeWA gf'[` W/Se gbVSfWV [` ? aaV Wfi fZW VWeUd[bf[a` [` fZW5 agdeWA gf'[`W? aaV WSbb {Wež

∋a U[Y[·]7fYX]h

A]_Y`; U`"

7F=7CG

7F=7CG`Dfcj]XYf`7cXY.`\$\$\$-,;

5W_bck `YX[Ya YbhcZ7ci bhfm

 $\label{eq:constraint} \begin{array}{l} K \in \mathcal{W}_{c} (M,Y) \in \mathcal{W}_{c$

5ddYbX]I. '9b[]bYYfg'5ighfU`]U'f195EDfcZYgg]cbU` '9b[]bYYf'7cadYhYbWm GHJbXUfX