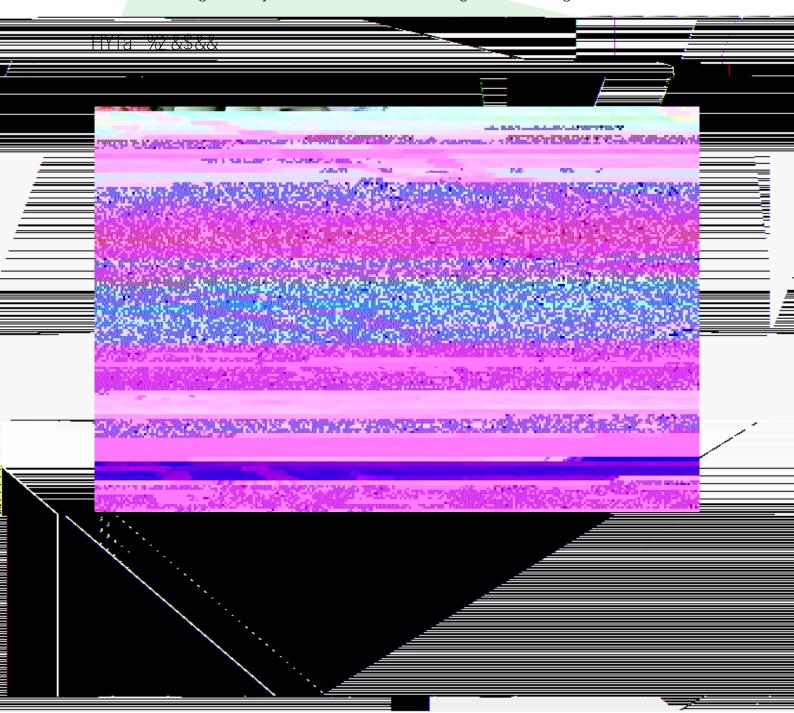


IEST5001

: fUa Yk cf_g`cZ9bj]fcba YbHJ``F Y`Uh]cbg'/ '@YUXYfg\]d



7ci fgY⁻Cj Yfj]Yk

GHJZ7cbHJWh8YHJ]`g

7cbj Ybcfg

B Ua Y	9a U]`	5j U]`UV]`]hm	@cWUhjcb	D\cbY
HYa UʻA]`ghY]b	Ma U"a]`ghY]b4 i bgk "YXi "Ui	6mUddc]bha Ybh Xi f]b[Wobgi `HUh]cb `\ci fg fK YXbYgXUmgž &!%d"a "Ł" : €) dYfgcb cf cb`]bY"	A cfj Yb 6fck b 6i] X]b[" A 6' *(

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GWkcc`7cbHJWhi±bZcfa Uh]cb

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HY`.'\$&'-'(, '\$(\$*

9a U]`. \<u>\U`4 i bgk "YXi "Ui</u>

5W_bck `YX[Ya YbhcZ7ci bhfm

I BGK '5frgž8Yg][b'UbX'5fW,]hYWi fY'? Ybg]b[hcb'UbX'DUXX]b[hcb'WJa di gYg'UfY'Vi]'hcb'5Vcf][]bU' @UbXg"'K Y'dUmci f'fYgdYWg'hc'h\Y'6]X'][U''UbX'; UX][U''dYcd'Yg'k \c'UfY'h\Y'7i ghcX]Ubg'cZh\YgY'`UbXg" K Y'UW_bck 'YX[Y'h\Y'5Vcf][]bU''UbX'HcffYg'GHfU]h=g'UbXYf'dYcd'Ygž'h\Y':]fgh5i ghfU']Ubgžk \cgY'`UbXgžk]bXg'UbX'k UhYfg'k Y'U``'bck 'g\UfYž'UbX'dUmfYgdYWhc'h\Y]f'i b]ei Y'j U'i Ygž'UbX'h\Y]f'Wcbh]bi]b['UbX YbXi f]b['W 'h fYg'k \]W. XYYYdYb'UbX'Ybf]W. 'h\Y'`]ZY'cZci f'bUh]cb'UbX'Wca a i b]h]Yg"''

.

7ci fgY 8YHJ] g

I b]hg cZ7fYX]h**

Gi a a UfmcZh\Y 7ci fgY

 $H\[g'WcifgY'dfcj]XYg'Ub']bhfcXi\[Wf]cb'hc'h\Y'Wcad'Yl'UbX'hfUbgX]gW]d']bUfmbUhifY'cZYbj]fcbaYbhUbX gcW]Yhm']ggiYg'UbX'h\Y']b\YfYbhVYbYZ]hg'UbX'W\U``Yb[Yg']b'ai'h]X]gW]d`]bUfm'UddfcUW\Yg'hc'Ybj]fcbaYbhU`YUXYfg\]d"'H\Y'Yad\Ug]g']g'cb'Yld`cf]b['WcbWYdhiU``UbX'dfUW]\W\'ZfUaYkcf_g'h\Uhi]bZcfa'`c\W\`UbX[`cVU``UddfcUW\Yg'hc'Ybj]fcbaYbhU`aYUb]b[gžfY`Uh]cbgžXYV][g]cbgžUbX'UW]cbg"'5'_YmaYggU[Y']g'h\Uh$

5ggYgga Ybh

5ggYgga Ybh'hUg_	K Y][\h	8iY'8UHY	7 ci fgY @YUfb]b[Ci hWca Yg 5ggYggYX
%"`K YY_`mFYUX]b[5ggYgga Ybh	(\$1	B chi5dd`]WUV`Y	%ž' ž'(
&""; fci d'DfYgYblUl]cb	&\$I	Bichi5dd`]\WV`Y	%ž'&ž'' ž'(ž')
' "':]Y`X`Dfc YWh	(\$1	5df]`&)	%ž &ž ' ž (ž)

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5ggYgga Ybh``Yb[h\.`&ž\$\$\$`k cfXg`

K YY_`mfYUX]b['UggYgga Ybhhc 'Yj U`i UhY 'UbX'gi ddcfhigh XYbhfYUX]b['Wca dfY\Ybg]cb"'&\$\$\$`]b'hchU`k cfXg'cj Yf'h\Y'hYfa "

A Uf_YX hc fYZYWhWca dfY\Ybg]cb 'Yj Y`"

H\]g`Ugg][ba Ybh]g`gi Va]hhYX`h\fci [\'Hi fb]h]b`UbX`ghi XYbhg`Xc`bchgYY`Hi fb]h]b`g]a]`Uf]hmfYdcfhg"

5XX]h]cbU`XYhU]`g

: cf'a cfY`XYhJ]`gžd`YUgY`fYZYf`hc`h\Y`"5ggYgga Ybh'±bghfi Whjcbg"`XcW'a Ybh'dcghYX`cb`h\Y`Wci fgY`A ccX`Y g]hY"

5ggYgga Ybh&; fci d DfYgYbhJh]cb

5ggYgga Ybh`Yb[h\. &\$a]bi hYg

5 % a]bi hY]b! WUgg dfYgYbhUh]cb cb 'U'dfYgg]b['Ybj]fcba YbhUbX 'gcW]Yhm]ggi Yž'i g]b['h\ Y '`Ybg cZh\ Uh k YY_'g ZfUa Yk cf_ž UbX 'Vf]b[]b['U'ZcW g cb '`YUXYfg\]d 'UbX 'fYghcfUh]j Y Z hi fYg"

K f]hhyb Zyyxvuw_dfcj]xyx uwwcfx]b[hc u fi vf]w"

H\]g^]g^bch'U^Hi fb]h]b^Ugg][ba Ybh

5XX]h]cbU`XYhU]`g

: cf`a cfY`XYhJ]`gž`d`YUgY`fYZYf`hc`h\Y`**"**5ggYgga Ybh'±oghfi Wjcbg**"**`XcW a Ybh'dcghYX`cb`h\Y`Wci fgY`A ccX`Y q]hY"

5ggYgga Ybh' .:]Y`X Dfc YWh

5ggYgga Ybh``Yb[h\.`&ž\$\$\$'k cfXg

8i Y'XUhY. '5df]`'&)

 $:]Y`X`ghi XmcZU`gY`Z!gY`YWYX`g]hY`k]h\`[i]XUbWY`Zfca`]bghfi Whcf"`Hi fbYX`]b`k cf_`]bWi XYg`Z]Y`X`bchYgž Ubgk Yfg`hc`Z]Y`X`ei Ygh]cb`[i]XYž`UbX`UbU`mg]g`cZg]hY`h\fci [\`h\Y``YbgYg`cZfY`Yj UbhWci fgY`ZfUa Yk cf_g"$

&\$\$\$ "k cfXg"]b"hchU`"

 $+ b! dfc W gg k cf_g cdd]b["":]bU `ZYYXV U W 'dfcj]XYX `U W cfX]b["hc 'U 'fi Vf] W cfX [b] bU `AYYXV U W 'dfcj]XYX `U W cfX]b["hc 'U 'fi Vf] W cfX [b] bU `AYYXV U W 'dfcj]XYX `U W cfX] b["hc 'U 'fi Vf] W cfX [b] bU `AYYXV U W 'dfcj]XYX `U W cfX] bU `AYYXV U W 'dfcj]XYX `U W cfX] bU `AYYXV U W 'dfcj]XYX `U W cfX] bU `AYYXV U W 'dfcj]XYX `U W cfX] bU `AYYXV U W 'dfcj]XYX `U W cfX] bU `AYYXV U W 'dfcj]XYX `U W cfX] bU `AYYXV U W 'dfcj]XYX `U W cfX] bU `AYYXV U W 'dfcj]XYX `U W cfX] bU `AYYXV U W 'dfcj]XYX `U W cfX] bU `AYYXV U W 'dfcj]XYX `U W CfX] bU `AYYXV U W 'dfcj]XYX `U W CfX] bU `AYYXV U W 'dfcj]XYX `U W CfX] bU `AYYXV U W 'dfcj]XYX `U W CfX] bU `AYYXV U W 'dfcj]XYX `U W CfX] bU `AYYXV U W 'dfcj]XYX `U W CfX] bU `AYYXV U W 'dfcj]XYX `U W CfX] bU `AYYXV U W 'dfcj]XYX `U W CfX] bU `AYYXV U W 'dfcj]XYX `U W CfX] bU `AYYXV U W 'dfcj]XYX `U W CfX] bU `AYYXV U W 'dfcj]XYX `U W CfX] bU `AYYXV U W 'dfcj]XYX `U W CfX] bU `AYYXV U W 'dfcj]XYX `U W 'dfcj]XYYX `U W 'dfcj]XYYY `U W 'dfcj]XYYY `U W 'dfcj]XYYY `U W 'dfcj]XYYYY `U W 'dfcj]XYYY `U W$

 $\label{thm:condition} $$H\]g'Ugg][ba\Ybh']g'g'Va\]hhYX'h\fci\[\\Thi\fb]h]b'UbX'ghi\XYbhg'Xc'bch'gYY'Hi\fb]h'b'g]a\]'Uf]hmfYdcfhg''$

5 X X]h]c b U``X Y HJ]`g

-	

FYgci fW/g

DfYgWf]VYX F Ygci fWYg

 $\label{eq:linear_model} $\operatorname{Mci}_{\underline{f}}^{\underline{f}}(y) = \operatorname{Mci}_{\underline{f}}^{\underline{f}}(y) = \operatorname{Mci}_{\underline{f}}^{\underline{$

FYWca a YbXYX FYgci fWYg

Mci 'UfY'Yl dYWYX'hc'a U_Y'[ccX'i gY'cZh\Y'fYUX]b[g'dfcj]XYX'Zcf'h\Y'Wci fgYž'UbX'hc'fYUX'VYmcbX'h\cgY a UhYf]U'g'Zcf'mci f'Ugg][ba Ybhg"'=bXYdYbXYbh'fYgYUfW\X']g'Yl dYWYX"

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

DUghYI dYf]YbW'`UbX`ghi XYbhZYYXVUW_`cb`h\Y`I BGK `cb`]bY`gi fj Ymhcc``a m9I dYf]YbW'`]bX]WUhYg`h\Y]a dcffUbW'`cZghi XYbhg`Xc]b[`WcgY`UbX`WUfYZ ``fYUX]b[`cZh\Y`k YY_`mUgg][bYX`fYUX]b[gž`cZYb[U[YX ghi XYbhdUff]WdUh]cb`]b`WUgg`X]gW gg]cbgž`UbX`cZghi XYbhjbXYdYbXYbhfYgYUfW."

Gi Va]gg]cb cZ5ggYgga YbhHUg_g

Hi fb]h]b Gi Va]gg]cb

Image: Ybwei bhyfu'dfcv'ya k \yb'uhhya dhjb['hc'gi va]hmci f'Ugg][ba Ybhh\fci [\ 'Hi fb]h]bž'd'YUgY

Hy'Yd\cby'9| hy'fbu''Gi ddcfhcb'-',) '' ' ' %cf'Ya U]''h\Ya 'cb'Y! hy'fbu'hy'hgi ddcfh4 i bgk "YXi "Ui "''Gi ddcfh
\ci fg'UfY', .\$\$Ua '-'%\$.\$\$da 'cb'k YY_XUmg'UbX'-.\$\$Ua '-').\$\$da 'cb'k YY_YbXg'fl *) 'XUmg'U'mYUft'''=Z'mci
UfY'i bUV'Y'hc'gi va]hmci f'Ugg][ba YbhXi Y'hc'U'ZJi 'hk]h\ 'Hi fb]h]b'mci 'a Um'Udd'mZcf'Ub'Y! hy'bg]cbž'Vi hmci
a i ghfYhJ]b'mci f'h]W_Yhbi a VYf'Zfca '9! hy'fbU''Gi ddcfhfU'cb['k]h\ 'Ubmch\Yf'fy'Yj UbhXcW a Ybhgt'hc
]bWi XY'Ug'Yj]XYbW' hc'gi ddcfhmci f'Y! hy'bg]cb'Udd']WUh]cb"'=Zmci 'Ya U]''9! hy'fbU''Gi ddcfhmci 'k]'`
Ui hca Uh]WJ'`mfYW']j Y'U'h]W_Yhbi a VYfZ'Vi h]Zmci 'hY'Yd\cbY'mci 'k]``bYYX'hc'gdYW]Z]WJ'`mUg_'Zcf'cbY''
Hi fb]h]b'U'gc'dfcj]XYg'i dXUhy'g'cb'h\Y]f'gmghYa 'ghUh' g'cb'Hk]hyf''

; YbYfU`mž'UggYgga YbhiHug_g'a i ghVY'gi Va]hhYX'Y`YVWfcb]\WJ``mij]U'Y]h\Yf'Hi fb]h]b'cf'U'A ccX`Y Ugg][ba Ybh''=b']bgHJb\W'g'k \YfY'h\]g']g'bchdcgg]V`Yž']hk]```VY'gHJhYX'cb'mci f'\\circ i fgY'g'A ccX`Y'g]hY'k]h\U`hYfbUh]j Y'gi Va]gg]cb'XYHJ]`g"

cfi]bZcfa Uhjcbicbi\ckihcigi Va]hUgg][ba Ybhgicbi]bYij]UiA ccXiY.i\hdg.#gh XYbhi bgk "YXi "Ui #\ck! gi Va]hUgg][ba Ybha ccXiY

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

D`U[]Uf]ga i]gii g]b[ih\Yik cfXgicfi]XYUgicZch\YfgiUbXidfYgYbh]b[ih\Ya iUgimci fick b"i±i\WbihU_Yia Ubm Zcfa gžZfca iXYi]VYfUhYiW\YUh]b[ihciU\W]XYbhU`m\Wcdm]b[iZfca iUigci f\Wik]h\ci hiU\w_bck iYX[Ya Ybh'

I BGK '[fci dg'd'U[]Uf]ga ']bhc'h\Y'Zc``ck]b['WUhY[cf]Yg.

7 cdm]b[. I g]b['h\Y'gUa Y'cf'j Yfmg]a]'Uf'k cfXg'hc'h\Y'cf][]bU`'hYl hcf']XYU'k]h\ci h'UW_bck 'YX[]b['h\Y gci fW' cf'i g]b['ei chUh]cb'a Uf_g"'H\]g']bWi XYg'Wcdm]b['a UhYf]U`gž']XYUg'cf'WcbW'dhg'Zfca 'U'Vcc_ž'Ufh]WYž fYdcfhcf'ch\Yf'k f]hhYb'XcW a Ybhz'dfYgYbhUh]cbž'Wca dcg]h]cbž'Uffk cf_ž'XYg][bž'XfUk]b[ž'W]fWi]hfmž'Wca di hYf dfc[fUa 'cf'gcZk UfYž'k YVg]hYž']bhYfbYhz'ch\Yf'Y`YWfcb]WfYgci fW'z'cf'Ubch\Yf'dYfgcbfg'Ugg][ba Ybhk]h\ci h Uddfcdf]UhY'UW_bck 'YX[Ya Ybh''

₺Uddfcdf]UhY 'dUfUd\fUg]b[.'

5 WUXYa]W±bZcfa Uhjcb

8 i Y 'hc 'Yj c'j]b['UXj]WY 'VmB GK '< YU'th žighi XYbhg'a i gh'WkYW_'Zcf'i dXUhYX']bZcfa Uh]cb 'fY[UfX]b['cb`]bY 'YUfb]b['Zcf'U``'5fhgž'8Yg][b 'UbX'5fWk]hYWhi fY 'Wci fgYg'th]g'thYfa 'fJ]U'A ccX'Y'cf'Wci fgY']bZcfa Uh]cb dfcj]XYX"Ł