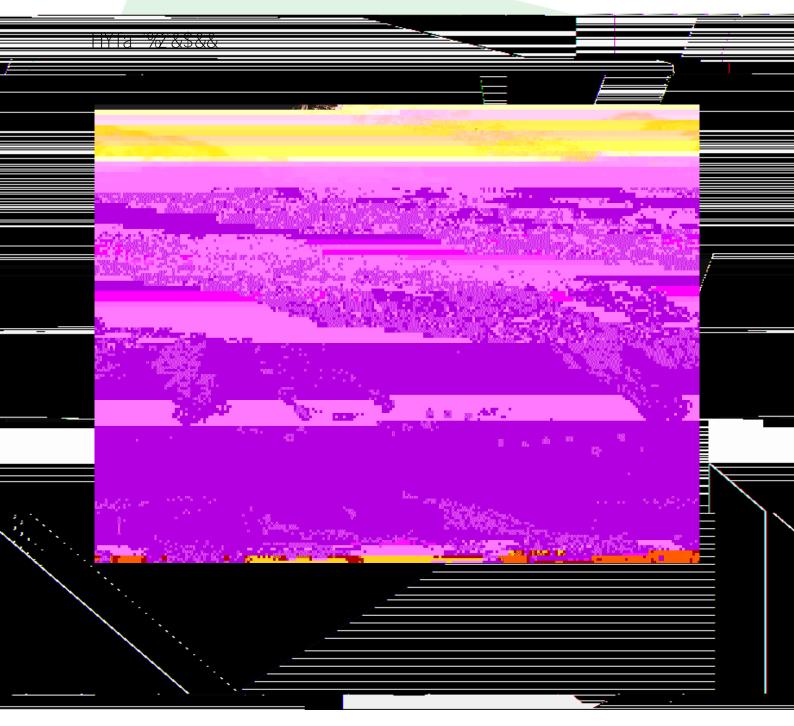


EDST5808

?Ymi7cbWYdhg`UbX`=ggiYg`]b';]ZhYX`9XiWUh]cb



7ci fgY^{*}Cj Yfj]Yk

GHJZ7cbHJWh8YHJ]`g

7cbj Ybcfg

B Ua Y	9a U]`	5j U]`UV]`] m	@cWUh]cb	D\cbY
; YfU'X]bY Hck bYbX	["hck bYbX4 i bgk "YXi "Ui	6mUddc]bha Ybh! d`YUgY Ya U]`	; &(A cfj Yb 6fck b	

GWXcc``7cbHJWh'±bZcfa Uh]cb

GWcc~cZ9Xi Whcb

5 fhgž8 Yg][b'UbX'5 fWX]hYWhifY

; fci bX': `ccfž'A cfj Yb '6fck b '6i]`X]b['fl &\$Ł

H. $^{'}$ Ž * % $^{'}$ f&Ł $^{'}$ - $^{'}$,) $^{'}$ % ++

9. YXi WUhcb4 i bgk "YXi "Ui

K. `\hdg.#kkk"Ufhg"i bgk"YXi "Ui #YXi WUhjcb

5W_bck `YX[Ya YbhcZ7ci bhfm

 $\label{eq:localized-loca$

 $\label{eq:continuous} \begin{array}{ll} \text{$:$} = \text{$U[Y'Wc$ if} \text{$fhYgmcZh}, Y'C$ $Z_jWY'cZh}, Y'Dfc'J]WY!7 \setminus UbWY``cf' = bX][Ybci g'] \\ \text{$:$} = \text{$U[Y'Wc$ if} \text{$fhYgmcZh}, Y'C$ $Z_jWY'cZh}, Y'Dfc'J]WY!7 \setminus UbWY``cf' = bX][Ybci g'] \\ \text{$:$} = \text{$U[Y'Wc$ if} \text{$fhYgmcZh}, Y'C$ $Z_jWY'cZh}, Y'Dfc'J]WY!7 \setminus UbWY``cf' = bX][Ybci g'] \\ \text{$:$} = \text{$U[Y'Wc$ if} \text{$fhYgmcZh}, Y'C$ $Z_jWY'cZh}, Y'Dfc'J]WY!7 \setminus UbWY``cf' = bX][Ybci g'] \\ \text{$:$} = \text{$U[Y'Wc$ if} \text{$fhYgmcZh}, Y'C$ $Z_jWY'cZh}, Y'Dfc'J]WY!7 \setminus UbWY``cf' = bX][Ybci g'] \\ \text{$:$} = \text{$U[Y'Wc$ if} \text{$fhYgmcZh}, Y'C$ $Z_jWY'cZh}, Y'Dfc'J]WY!7 \setminus UbWY``cf' = bX][Ybci g'] \\ \text{$:$} = \text{$U[Y'Wc$ if} \text{$fhYgmcZh}, Y'C$ $Z_jWY'cZh}, Y'Dfc'J]WY!7 \setminus UbWY``cf' = bX][Ybci g'] \\ \text{$:$} = \text{$U[Y'Wc$ if} \text{$fhYgmcZh}, Y'C$ $Z_jWY'cZh}, Y'Dfc'J]WY!7 \setminus UbWY``cf' = bX][Ybci g'] \\ \text{$:$} = \text{$U[Y'Wc$ if} \text{$fhYgmcZh}, Y'C$ $Z_jWY'cZh}, Y'Dfc'J]WY!7 \setminus UbWY``cf' = bX][Ybci g'] \\ \text{$:$} = \text{$U[Y'Wc$ if} \text{$fhYgmcZh}, Y'C$ $Z_jWY'cZh}, Y'Dfc'J]WY!7 \setminus UbWY``cf' = bX][Ybci g'] \\ \text{$:$} = \text{$U[Y'Wc$ if} \text{$fhYgmcZh}, Y'C$ $Z_jWY'cZh}, Y'Dfc'J]WY!7 \setminus UbWY``cf' = bX][Ybci g'] \\ \text{$:$} = \text{$U[Y'Wc$ if} \text{$fhYgmcZh}, Y'C$ $Z_jWY'cZh}, Y'Dfc'J]WY!7 \setminus UbWY``cf' = bX][Ybci g'] \\ \text{$:$} = \text{$U[Y'Wc$ if} \text{$fhYgmcZh}, Y'C$ $Z_jWY'cZh}, Y'Dfc'J]WY!7 \setminus UbWY'``cf' = bX][Ybci g'] \\ \text{$:$} = \text{$U[Y'Wc$ if} \text{$fhYgmcZh}, Y'C$ $Z_jWY'cZh}, Y'Dfc'J]WY!7 \setminus UbWY'``cf' = bX][Ybci g'] \\ \text{$:$} = \text{$U[Y'Wc$ if} \text{$fhYgmcZh}, Y'C$ $Z_jWY'cZh}, Y'Dfc'J]WY!7 \setminus UbWY'``cf' = bX][Ybci g'] \\ \text{$:$} = \text{$U[Y'Wc$ if} \text{$fhYgmcZh}, Y'C$ $Z_jWY'cZh}, Y'Dfc'J]WY!7 \setminus UbWY'``cf' = bX][Ybci g'] \\ \text{$:$} = \text{$U[Y'Wc$ if} \text{$fhYgmcZh}, Y'C$ $Z_jWY'cZh}, Y'Dfc'J]WY!7 \setminus UbWY'```cf' = bX][Ybci g'] \\ \text{$:$} = \text{$U[Y'Wc$ if} \text{$fhYgmcZh}, Y'C$ $Z_jWY'cZh}, Y'Dfc'J]WY!7 \setminus UbWY'C$ $Z_jWY'cZh}, Y'Dfc'J]WY!7 \setminus UbWY'C$ $Z_jWY'cZh}, Y'Dfc'J]WY'C$ $Z_jWY'CAL}, Y$

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5ggYgga Ybh'hUg_	K Y][\h	8iY'8UHY	7 ci fgY @YUfb]b[Ci HWca Yg 5ggYggYX
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8i Y'XUhY.'\$(#\$'#&\$&&'\$).\$\$'DA

 $HUg_`\%! `DfYdUfY`U'dUdYf'h`Uh'dfcj~]XYg`U'fYZYWf]cb`cb`[~]ZhYX'ghi~XYbhg\#~]ZhYX'YXi~WUh]cb`k~]h`fYZYfYbW'hchxY'`]hYfUhi~fY"$

Gh XYbhg k]``fYWY]j Y k f]hhYb ZYYXVUW_k]h\]b '%\$ XUmg cZgi Va]gg]cb

5XX]h]cbU`XYhU]`g

 $7 \times 2^{h} \text{ fYY'} \text{ lggi Yg'} \text{ h} \text{ Uh'Ya Yf} \text{ [YX'} \text{ fca 'mci f'fYUX]} \text{ b} \text{ ['cZh'Y'']} \text{ hYfUh' fY''} \text{ fY''} \text{ h'b} \text{ ['hc'hcd]} \text{ Wg''Wcj YfYX']} \text{ b'Ubm}$

Ghi XYbhg`k]``fYWY]j Y`kf]hhYb`ZYYXVUW_`k]h\]b`%\$`XUmg`cZgi Va]gg]cb H\]g`]g`h\Y`Z]bU``UggYgga YbhihUg_" 5ggYgga Ybh'HUg_'% FYZYWh]cb

GdYW	 	``f]Ł		 2fŽŁ
	fghUbX]b['cZh\Y'ei Ygh]cb'cf']ggi Y'UbX'h\Y'_YmWcbWfdhg			
:	cZUbU'mg]g'UbX'Wf]hjei Y']b'fYgdcbgY'hc'h\Y'hUg_ 8Ya cbghfUhjcb'cZXYYd'UbX'Wf]hjWU'h\]b_]b['UVci hih\Y'gY'YWfYX]ggi Yg DfYgYbfUhjcb'cZ]bg][\hi] ''UbX'UWW fUhY']bhYfdfYhUhjcbg'cZh\Y fYgYUfW\'Yj]XYbW 5ddfcdf]UhYbYgg'cZh\Y'Udd']WUhjcb'cZh\Y'fYgYUfW\'hc'h\Y'hUg_ 8Ya cbghfUhjcb'cZcf][]bU' UbX']bXYdYbXYbhih\ci [\h]Uf]lmik]h\'UbX'fY'Yj UbWY'cZ'dfcZYgg]cbU''UbX#Cf'fYgYUfW\ i fY'i gYX'hc'gi ddcfhfYgdcbgY)	

GdYWJZJW7 f]hYf]U		``flŁ		
DfYgYbHJhjcbicZifYgdcbgYiUWWcfX]b[ihciUddfcdf]UhYiUWUXYa]WUbXi]b[i]ghjWWcbjYbhjcbg				
 7`Uf]hmcZk f]h]b['fY"["žgYbhYbWY'ghfi Whi fYždUfU[fUd\]b[ž j cWUVi `UfmžgdY``]b[ždi bWhi Uh]cbŁ 				
• I gY`cZUb`Uddfcdf]UhY`UWUXYa]WghmY`cZkf]hjb[
 I gY cZUddfcdf]UhY Wcbj Ybh]cbg]b UWUXYa]Wk f]h]b['fY''["ž W]hUh]cbgždUfUd\fUg]b[žfYZYfYbWY `]ghz 				
• 7`Uf]micZhUV`Ygr[[i fYg`fUg`Udd`]WUV`YŁ				
• F YUXUV]`]hm				
FYgdYV\nZcf'kcfX``]a]\ng				
; YbYfU`Wcaa Ybhg#YWcaa YbXUh]cbgʻZcfʻbYl h'h]aY.ʻ				

FYWcaaYbXYX. #&\$ fl @DG7F8B<8 KY][\h]b[. (\$i

B6. H\Y'h]W_g']b'h\Y'j Uf]ci g'Vcl Yg'UfY'XYg][bYX'rc'dfcj]XY'ZYYXVUW_'rc'ghi XYbhg/h\Ym'UfY'bch'[]j Yb Yei U`k Y][\h']b'XYhYfa]b]b['th\Y'fYWca a YbXYX'[fUXY"8YdYbX]b['cb'h\Y'bUhi fY'cZh\Y'UggYgga Ybh'HUg_ž YWhi fYfg'a Um'U`gc 'WcbhYl hi U`]gY'UbX#cf'Ua YbX'h\YgY'gdYWJZWWf]hYf]U"' H\Y'fYWca a YbXYX'[fUXY']g hYbhUhjj Y'cb`mž'gi VYWhic'ghUbXUfX]gUhjcb'dfcWfggYg'UbX'Uddfcj U``Vmh\Y'GW\cc``cZ9Xi WUhjcb'@YUfb]b[UbX'HYUW\]b['7 ca a]hYY"

FI 6F = 7 # 998657? 'G < 99H 98GH), \$, '? 9M7CB79DHG'5B8' = GGI 9G' = B'; = H98'98I 75H = CB I BGK 'G7 < CC@'C: '98I 75H = CB

5ggYgga YbhHUg_ & 5Xj cWUWmUfhJWY

GdYW]Z]W7f]hYf]U	``flŁ		−2fŽŁ	
I bXYfghUbX]b[cZh\Y'ei Ygh]cb'cf']ggi Y'UbX'h\Y'_YmWcbWYdhg]bj c`j YX				

GdYWJZJW7 f]HYf]U		··flŁ		— 2fŽŁ	
DfYgYbHJhjcb`cZ`fYgdcbgY`UWWcfX]b[`hc`Uddfcdf]UhY`UWUXYa]WUbX `]b[i]ghjWWcbjYbhjcbg					
 7`Uf]hmicZk f]h]b['fY"["žigYbhYbWY'ghfi Whi fYžidUfU[fUd\]b[ž j cWUVi `UfmžigdY``]b[židi bWhi Uh]cbŁ 					
• I gY`cZUb`Uddfcdf]UhY`UWUXYa]WghmY`cZkf]h]b[
 I gY'cZUddfcdf]UHY'Wcbj Ybh]cbg']b'UWUXYa]Wk f]h]b['fY"["ž Whuh]cbgždUfUd\fUg]b[žfYZYfYbWY'`]ghŁ 					
• 7`Uf]lmicZlUV`Yg뢴[i fYg'fUg'Udd`]WUV`YŁ					
• FYUXUV]`]lm					
• FYgdYWhiZcfik cfXii]a]hg					
; YbYfU`Wca a Ybhg#YWca a YbXUh]cbg'Zcf'bYl h'h]a Y.'					

FYWca a YbXYX.

'#&\$'f1@'DG'7F'8B'<8Ł

KY][\h]b[.

* \$ı

B6. H\Y'I]W_g`]b`I\Y'j Uf]ci g`Vcl Yg`UfY`XYg][bYX`Ic`dfcj]XY`ZYYXVUW_`Ic`ghi XYbhg/I\YmUfY`bchi[]j Yb Yei U``k Y][\hi]b`XYhYfa]b]b['I\X'fYVca a YbXYX`[fUXY"8YdYbX]b['Icb'I\X'bUhi fY`cZi\Y`UggYgga Ybh'HUg_ž `YWfi fYfg`a Um'U`gc`VcbIYl Ii U`]gY`UbX#cf`Ua YbX`I\YgY`gdYWJZ]WWf]IYf]U": H\Y`fYVca a YbXYX`[fUXY`]g \hYbHJhji Y`cb`mz`gi VYWfic`gHJbXUfX]gUI]cb`dfcWfggYg`UbX`Uddfcj U``VmI\Y`GW\cc``cZ9Xi WJI]cb`@YUfb]b[UbX`HYUW\]b['7 ca a]hYY"

5 hmyb XUb WY F Yei]fYa Yb hg

GW.cc`cZ'9Xi WUh]cb'5HYbXUbWYFYei]fYa Ybh

H\Y`GW\cc``cZ9Xi WUhjcb`fG98&fYei]fYgʻghi XYbhgʻa YYhiUʻa]b]a i a `UhhYbXUbW\`fYei]fYa YbhcZ, \$i `cZU`` gW\YXi `YX`WUggYgʻf]"%"`YWhi fYgžhi hcf]Uʻgžk cf_g\cdgžgYa]bUfg&Zcf`U```Wci fgYg"`5hhYbXUbW\`]b`dYfgcb`]g fYei]fYX`Zcf`hi hcf]UʻgžgYa]bUfgž`UbX`k cf_g\cdg`k \Yb`Wci fgY`UfY`XY`]j YfYX`]b`ZUW\!hc!ZUW\`a cXY''=hi]g`h\Y fYgdcbg]V]`]micZghi XYbhgʻhc`Ybgi fY`h\Uhih\Y]f`UhhYbXUbW\`]g`fYWcfXYX`Zcf`h\Y`ZUW\`hc`ZUW\`Y]h\Yf`Vm Y`YWhfcb]Wa YUbgʻcf'j]U`Ub`UhhYbXUbW\`fY[]ghYf"`5hhYbXUbW\`]b`cb`]bY`cf`V`YbXYX`a cXY`k]```VY`UggYggYX h\fci [\`X][]hU`": i fh\Yf`]bZcfa Uhjcb`WUb`VY`Zci bX`\\fYf\"

FYgci fWyg

 $\text{Det Mognitude } \text{JWMY-Width} \text{ growing fWM } g^{\cdot}$

 $\label{eq:hammer_hammer} \mbox{H\Y'\h'} \mbox{Ih\V'\h'} \mbox{Ih\V'\C} \mbox{Ib\V'\C} \mbox{Ib$

Gi Va]gg]cb cZ5ggYgga YbhHUg_g

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

Image: Ybwci bhYf'U'dfcV'Ya k \Yb'UhYa dhJb['hc'gi Va]hmci f'Ugg][ba Ybht\fci [\'Hi fb]hJbž'd'YUgY

HY'Yd\cbY'9| hYfbU''Gi ddcfhcb'-',) '' ' ' %cf'Ya U]''h\Ya 'cb'Y! hYfbU'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'mYUfŁ"'=Imci
UfY'i bUV'Y'hc'gi Va]hmci f'Ugg][ba YbhXi Y'hc'U'ZJi 'hk]h\'Hi fb]hJb'mci 'a UmUdd'mZcf'Ub'Y! hYbg]cbž'Vi hmci
a i ghfYhJ]b'mci f'hJW_Yhbi a VYf'Zfca '9! hYfbU''Gi ddcfhfU'cb['k]h\'Ubmch\Yf'fY'Yj UbhXcW a YbhgŁ'hc
]bWi XY'Ug'Yj]XYbW'hc'gi ddcfhmci f'Y! hYbg]cb'Udd']WUhJcb"'=Imci 'Ya U]''9! hYfbU''Gi ddcfhmci 'k]''
Ui hca UhJWJ'`mfYW']j Y'U'hJW_Yhbi a VYfž'Vi h]Zmci 'hY'Yd\cbY'mci 'k]''`bYYX'hc'gdYWJZJWJ'`mUg_'Zcf'cbY''
Hi fb]hJb'U'gc'dfcj]XYg'i dXUhYg'cb'h\Y]f'gmghYa 'ghUh' g'cb'Hk]hYf"

; YbYfU``mž'UggYgga YbhiHug_g'a i gh'VY'gi Va]hhYX'Y`YWfcb]WJ``mj]U'Y]h\Yf'Hi fb]h]b'cf'U'A ccX`Y Ugg][ba Ybh'' = D']bgHJbWYg'k \YfY'h\]g']g'bchdcgg]V'Yž']hk]``VY'gHJhYX'cb'mci f'Wci fgY'g'A ccX`Y'g]hY'k]h\

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

D`U[]Uf]ga `]g`i g]b['h\Y`k cfXg`cf`]XYUg`cZch\Yfg`UbX`dfYgYbh]b['h\Ya `Ug`mci f`ck b"`=hWJb`hJ_Y`a Ubm Zcfa gžZca `XY`]VYfUhY`W\YUh]b['hc`UVW]XYbhJ``mWcdm]b['Zfca `U`gci fWY`k]h\ci hUW_bck `YX[Ya Ybh'

IBGK [fcidgdu[]Uf]ga]bhch\YZc``ck]b[WUhY[cf]Yg.

 $\begin{tabular}{ll} \hline \textbf{7.cdm}b[...] g]b[...] MY cf'j Yfmg]a] ``Uf'k cfXg'hc'h\Y'cf][] bU``HYI hcf']XYU'k]h\ci h`U\W_bck ``YX[]b[...] b[...] MY cf'i g]b[...] bU``HYI hcf']XYU'k]h\ci h`U\W_bck ``YX[]b[...] b[...] MY cf'i g]b[...] a UhYf]U`gž']XYUg'cf'WcbW'dhg'\bar{Z}ca '`U'Vcc_\bar{Z}Ufh]WY\bar{Z}ca '`U'Vcc_\bar{Z}Ufh]\bar{Z}ca '`U'Vcc_\bar{Z}Ufh]\bar{Z}ca '`U'Vcc_\bar{Z}Ufh]\bar{Z}ca '`U'Vcc_\bar{Z}Ufh]\bar{Z}ca '`U'Vcc_\bar{Z}Ufh]\bar{Z}ca '`U'Vcc_\bar{Z}Ufh]\bar{Z}ca '`U'Vcc_\bar{Z}Ufh]\bar{Z}ca '`U'Vcc_\bar{Z}Ufh]\bar{Z}ca '``U'Vcc_\bar{Z}Ufh]\bar{Z}ca '``U'Vcc_\bar{Z}Ufh]\bar{Z}ca '``U'Vcc_\bar{Z}Ufh]\bar{Z}Ufh]\bar{Z}Ufh]\bar{Z}ca '``U'Vcc_\bar{Z}Ufh]\bar{Z}U$

5 WUXYa]W + DZcfa Uh]cb

8 i Y 'hc 'Yj c'j]b['UXj]\W 'VmBGK '< YU't\ ž'ghi XYbhg'a i gh'\W.Y\<u>V</u>'Zcf'i dXUh\YX']bZcfa Uh]cb 'fY[UfX]b['cb`]bY 'YUfb]b['Zcf'U``'5fhgž'8Yg][b 'UbX'5f\W.]h\Y\ni fY '\wci fgYg't\]g't\Yfa 'f]]U'A ccX`Y'cf'\wci fgY']bZcfa Uh]cb dfcj]\XYX"Ł

: cf`YggYbhJU``gh XYbh`]bZcfa UhJcb`fY`UhJb['hc.

- fYei YghgʻZcfʻYl hYbg]cb/
- `UhY gi Va]gg]cbg [i]XY`]bYg/
- fYj]Yk cZa Uf_g/
- I BGK '< YU`h\ 'UbX'GUZYhm'dc`]W]Yg/
- YI Ua]bUh]cb dfcWYXi fYg/

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