



# ARTS2033

DcYlfmUbX'DcYhWg

HYfa`H\fYY`##`&\$&\$



GWcc`cZHAY`5ftg`UbX`A`YXJU`##`I`BGK`..5ftg`UbX`GcWU`G`WYbWg

7 ci fgY`Cj Yfj ]Yk

GhJZZ`7 cbhJW`8 YHJ`g

7 cbj Ybcfg

B Ua Y	9a Uj`	5j Uj`UVj`]m	@cWjhcb	D\cbY
GYUb`Dfmc`f	g"dfmc`f4 i bgk "YXi "Ui	6mUddc]bha Ybh	F cVYfh K YVghYf`&%`	- ' , ) + ' %)

GW`cc``7 cbhJW`h`bZcfa Uh]cb

GW`cc``cZ`hY`5 frg`UbX`A YX]U

F cca`" %&`z`@Yj Y`` ž F cVYfhK YVghYf`6i ]X]b[ `fj` %(` Ł

D\cbY.`f`\$&`Ł`-`'` ,` )` `( ,` )` \*`

9a Uj]: [gUa 4 i bgk "YXi "Ui](#)

K YVg]hY: [k.k.k "Ufmg"i bgk "YXi "Ui #gUa](#)

H\Y`GW`cc``cZ`hY`5 frg`UbX`A YX]U`k ci `X``]\_Y`hc`F YgdYW`Z` ``m5W`bck`YX[ Y`hY`HfUX]h]cbU``7 i g`hcX]Ubgž`  
hY`6YXY[ U``fP`Ybg]b[ hcb`W`a di gŁž; UX][ U``f7 ]mUbX`5 fhv` 8Yg][ b`7 Ua di gYgŁ`UbX`hY`B [ i bbUk U`  
dYcd`Y`f5i g`hfU]Ub`8Y`Z`bVW` : cfW` 5W`UXYa m]b`7 UbVYffUŁ`cZ`hY`UbXg`k \YfY`YUW`W`a di g`cZi` B`GK` ]g`  
`cW`hY`X`"

7 ci fgY'8YHJ]`g

7 fYX]hDc]bhr \*`

Gi a a UfmicZhY'7 ci fgY

Gi VYWh5fYU.'7` Y`eZ

H\]g'Wci fgY'WU'U'gc'VY'gh X]YX' ]b'hY'Zc`ck ]b[ 'gdYWU' ]gU]cbg.'5 d\sf[hWl` dff` Y

K \Uh]g'dcYHfM3'<ck'Xc'k Y'\_bck'U'dcYa'k \Yb'k Y'gYY']z'UbX'k \m]g'dcYHfMhY'a cgha cj ]b[ 'z'hY'a cgh  
WU'Yb[ ]b[ 'z'UbX'hY'a cgha Ya cfUV'Y'cZ']h'fUfmZcfa g3'z'h]g'Wci fgY'nci'k ]'YbWci bh'f'U'fU'Ub[ Y'cZ  
UW'Wca d']g\YX'UbX' ]bZi Ybh]U'k cf\_g'Zca'UW'fcgg'hY'['cVY'UbX'UW'fcgg'hY'W'bh'f]Yg.'Zca'fUj ]g\ ]b[ 'cj Y  
dcYa g'hc'Wca ]WVU'UXgZ'Zca' \ ]d'\cd'hc'X][ ]h'U'dcYHfM' Mci'k ]'YUfb'hc'h ]b\_UVci hgi W'k cf\_g' ]b'fY'U]cb  
hc'hY]f'\ ]g'hc'f]W'W'cbhY' hgZ'Zca' dc' ]h]W'fY' c'i h]cb'hc'g'W'Ybh]Z'WXYj Y'cda Ybhg'"5bX'nci'k ]'X]g'Wcj Yf'bYk  
k Um]cZ'h ]b\_ ]b[ 'UVci hdcYHfM'hY'cfY]W'`nZ'Zca' hY'g][ b]Z'WU'W'cZ'Zca' U'ZY'Uh'fYg'gi W'Ug'j c]W'UbX  
a YfY'hc'hY'W'cbW'dh' U'X]ZY'fYbW'g'VY'hk Y'Yb'dcYHfM'UbX'chY'f'U'fhiZcfa g'gi W'Ug'a i g]W'UbX'hY'bcj Y'"  
H\Y'U]a' ]g'hc'XYj Y'cd'U'h'cfci [ \ [ fci bX]b[ ' ]b'hY'\ ]g'hc'fmcZdcYHfM'Ug'U'Zcfa z'hc'\cbY'nci'f'W]h]W'g\_]`g  
 ]b'UbU'm]g]b[ 'dcYHfM'z'UbX'hc'UW]Yj Y'U'gcd\ ]g]h]W'Y'X' [ fUgd'cZ'W'cbhYa' dc'fUfm'XYVU'hY'g'UVci h'hY' b'Uh'fY'UbX  
g][ b]Z'WU'W'cZ'Zca'YHfM'

7 ci fgY'@YUfb]b[ 'Ci hWca Yg

%" 8Ya cbghfUHY'U'\_bck'YX[ Y'cZdcYHfMk f]hY'b' ]b'U'j Uf]YHmcZd'UW'g'UhU'j Uf]YHmcZ'h]a Yg"  
&" @cWU'h' dcYa g' ]b'hY]f'\ ]g'hc'f]W'z'gc'W'U'z'W' h' fU'z'UbX'Y'W'cbca ]W'W'cbhY' ]g"  
' "' 9l d'U]b'a U'cf' ]ggi Yg' ]b'hY'hY'cfm'cZdcYHfM'z'UbX'Vf]b[ 'h'Uh'hY'cfm'hc'VY'Uf'cb'hY'UbU'm]g]g'cZ  
gdYW'Z'WdcYa g"  
( " H\ ]b\_ W]h]W'`m'UbX'k f]h'`dYf'gi Ug]j Y'm'UVci hdcYHfM'

HYUW]b[ 'GhfUHY[ ]Yg'

H\]g'Wci fgY' ]bj c'j Yg'k YY'\_m`YWh' fYg'UbX'h'hc'f]U'g'"H\Y'`YWh' fYg'UfY'XYg][ bYX'hc'XYa cbghfUHY'hY'W'cgY  
UbU'm]g]g'cZdcYHfM'z'hc'dfcj ]XY'gh X'Ybhg'k ]h'\ ]g'hc'f]W'V'UW\_[ fci bX'hc'hY'gY'hdcYa gZ'UbX'hc'YI'Ua ]bY  
a U'cf'YI'Ua d'Yg'cZ'hY'hY'cfm'cZdcYHfM'

@YWh' fYg'a cXY'Z'f'gh X'Ybhg'hY'k Um]g' ]b'k \ ]W' ]bZcfa U]cb' ]g'cf[ Ub]gYX'UbX'Uf[ i a Ybhg'UfY'a UXY' ]b'hY  
X]g]W'd' ]bY'cZ9b[ ' ]g\ "'Hi'hc'f]U'g'fYei ]fY'gh X'Ybhg'hc'Yb[ U[ Y'UW]j Y'mk ]h'hY'fYUX]b[ g'UbX'hc'XYj Y'cd'hY]f  
ck b'W]h]W'fYg'dc'bgYg'"H\ ]g'c'W'W'fg'h'fci [ \ ]g'f'i W'h' fYX'WU'gg'X]g'W'gg]cb'UbX'ga U'![ fci d'YI'Y'fW]gYg"

## 5ggYgga Ybh

FYZfYbW]b[ "Gh XYbhg'UFY'ZFY'hc'WkccgY'k\]WYj Yf'fYZfYbW]b[ 'gmgH'a 'hYmidfYZf'<ck Yj Yfz']b a U\_]b[ 'h\]g'Wk]W'gri XYbhg'g\ci 'X'VYUf']b'a ]bX'hY'di fdcgY'cZfYZfYbW]b[ . 'hc'[ i ]XY'hY'fYUXYf'hc gci fW'gZ'UbX'k \Yb'bYW'ggUfmihc'hY'fY'Yj UbhdUfhcZ'hY'gci fW' ]b'ei Ygh'cb'"5b'Ui h'cf!XUhf'gmgH'a k ]h'ci hdU[ Y'bi a VYfg' ]g'h'i g'dYfZYWimUddfcdf]UH'Zcf'gWk'Uf'mk f]h]b[ 'XYU']b[ 'k ]h'g'lc'fhk cf\_g XY' ]j Yf]b[ 'g]b[ 'Y' ]XYUgZ'Vi h'hY'gUa Y'gmgH'a ' ]g' ]bUddfcdf]UH'k \Yb'W]h]b[ 'U'bcj Y'Z'U'dcYa Z'U'gi VghUbh]U' ĉi fbU'Ufh]WY'Z'U'gWk'Uf'ma cbc[ fUd\Z'cf'U'k cf\_'cZUm'Yb[ h'UbX'W'a d'YI ]m'f'ĉ'h'cgY'WUgYgZ'dU[ Y'cf ]bY'bi a VYfg'UFY'YggYbh]U'Zcf'hY'fYZfYbW'hc'Xc' ]rg' ]bh'Y'YW'i U'k cf\_"

K cfX'7ci bhg'"5"'ei chU]h'cbg'UbX'fYZfYbW'g'UFY' ]bWi XYX' ]b'k cfX'W'ci bhgZ'k \]Y'V]V' ]c[ fUd\]Yg'UFY'bcf'"5 a Uf[ ]b'cZ%'\$i 'UVcj Y'UbX'VY'ck 'hY'g'h'di 'UH'X'k cfX'W'ci bhk ]'VY'UVW'Wdh'X'k ]h'ci hdYbU'h'm"

## 5ggYgga YbhHUg\_g'

5ggYgga YbhHUg_	K Y][ \h	8i Y'8UH'	Gh XYbh@YUfb]b[ Ci hW'a Yg'5ggYggYX
A U'cf'9ggUm	) \$i	&&#/%\$#&\$&\$'%) - 'DA	(
HU_Y!<ca Y'9I Ua '	) \$i	&' #/%\$#&\$&\$'%) - 'DA	%Z(

## 5ggYgga Ybh8YHJ]`g

5ggYgga Ybh% 'A U'cf'9ggUm

GHUfhXUH'.

8YHJ]`g.

&Z\$\$\$'k cfXgZ'ZYXVUW'dfcj ]XYX'j ]U'Hi fb]h]b

Hi fb]h]b'gYH]b[ . 'H\]g'Ugg][ ba Ybh]g'gi Va ]h'X'h'fci [ \ 'Hi fb]h]b'UbX'gh XYbhg'Xc'bc'hgYY'Hi fb]h]b g]a ]Uf]m'fYdcf'rg"

5ggYgga Ybh& 'HU\_Y!<ca Y'9I Ua

GHUfhXUH'.

8YHJ]`g.

&\$\$\$'k cfXg": YYXVUW'dfcj ]XYX'j ]U'Hi fb]h]b"

Hi fb]h]b'gYH]b[ . 'H\]g'Ugg][ ba Ybh]g'gi Va ]h'X'h'fci [ \ 'Hi fb]h]b'UbX'gh XYbhg'Xc'bc'hgYY'Hi fb]h]b g]a ]Uf]m'fYdcf'rg"

5 HhYbXUbW F Yei ]fYa Ybhg

Gh XYbhg UfY ghfc b[ mYbWci fU[ YX hc UHhYbX U WUggYg UbX fYj ]Yk YW h fY fYWc fX]b[ g"

7 ci fgY GWXYXi Y

[J Yk WUgg hja YhUV Y](#)

Hja YhUV Y

8UhY	HmdY	7cbhYbh
K YY_%%(GYdhYa VYf! %GYdhYa VYf	@YWh fY	H\Y YU cZDcYHfm
K YY_&.&%GYdhYa VYf! &)GYdhYa VYf	@YWh fY	J c]W
K YY_'&.&GYdhYa VYf! &C Wc VYf	@YWh fY	J ]g]cb
K YY_(.)C Wc VYf! - C Wc VYf	@YWh fY	A YhfY
K YY_) .%&C Wc VYf! %* C Wc VYf	@YWh fY	A i g]W
K YY_*.%-C Wc VYf! & C Wc VYf	@YWh fY	: @9L K 99?
K YY_+. &*C Wc VYf! '\$ C Wc VYf	@YWh fY	HfUbg Uh]cb
K YY_ , .&Bcj Ya VYf! * Bcj Ya VYf	@YWh fY	< ]ghc fm
K YY_- .- Bcj Ya VYf! % Bcj Ya VYf	@YWh fY	>i X[ Ya Ybh
K YY_%.%* Bcj Ya VYf! &\$ Bcj Ya VYf	@YWh fY	H\Y YU cZDcYHfm F Ydf]gY

F Ygci fWg

DfYgWf]VYX`F Ygci fWg`

F YWca a YbXYX`F Ygci fWg

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

Gh XYbkg`k ]`VY`YbWci fU[ YX`tc`Z`ci hcb`]bY`A m9I dYf]YbW`gi fj Yng`UhkY`YbX`cZkY`Wci fgY`gc`hUh  
Z fhYf`]a dfcj Ya Ybkg`a UmVY`a UXY`"

Gi Va ]gg]cb`cZ5ggYgga YbhiHUg\_g

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

≠mci`YbWci bHYf`U`dfcV`Ya`k` \Yb`UH`Ya` dh]b[`hc`gi`Va`]hmc`i`f`Ugg][`ba`Ybhi`h`fci`[`\`Hi`fb]h]b`z`d`Y`Ug`Y`  
HY`Yd`cb`Y`9I`HY`fb`U`Gi`ddc`fh`cb`-`,`,)``''`%`cf`Ya`U]`h`Ya`i`cb`YI`HY`fb`U`HY`hgi`ddc`fh`4`i`bgk`"YXi`"Ui`""`Gi`ddc`fh`  
`l`ci`fg`UfY`,`.\$\$Ua`-`-%\$.\$\$da`i`cb`k`YY`XUmg`UbX`-`.\$\$Ua`-`).\$\$da`i`cb`k`YY`YbXg`fI`\*)`XUmg`U`mY`UfI`"≠mci`  
UfY`i`bUV`Y`hc`gi`Va`]hmc`i`f`Ugg][`ba`Ybhi`Xi`Y`hc`U`Zi`h`k`]h`Hi`fb]h]b`mci`i`a`Um`Udd`m`Zc`f`Ub`YI`HY`bg]cb`z`Vi`hmc`i`  
a`i`gh`fY`hU]b`mci`f`h]W`Y`hbi`a`VY`f`Z`ca`9I`HY`fb`U`Gi`ddc`fh`f`U`cb[`k`]h`Ub`mci`h`Y`f`fY`Yj`Ub`h`Xc`W`a`Y`b`hg`L`hc`  
]b`Wi`XY`Ug`Yj`]X`Y`b`V`W`hc`gi`ddc`fh`mci`f`YI`HY`bg]cb`Udd`]W`h]cb`"≠mci`Ya`U]`9I`HY`fb`U`Gi`ddc`fh`mci`k`]`  
Ui`hc`a`U`h]W`U`m`f`Y`W`]j`Y`U`h]W`Y`hbi`a`VY`f`z`Vi`h]Z`mci`HY`Yd`cb`Y`mci`k`]`b`Y`Y`X`hc`gd`Y`W`Z]W`U`m`Ug`\_`Zc`f`cb`Y`"  
Hi`fb]h]b`U`gc`d`fcj`]X`Y`gi`d`X`U`h`g`i`cb`h`Y]f`g`mg`h`Ya`i`gh`U`h`g`i`cb`Hk`]h`Y`f`"

;`Yb`Y`f`U`m`z`Ugg`Y`gga`Yb`hi`U`g`\_`g`a`i`gh`V`Y`gi`Va`]h`Y`X`Y`Y`W`f`cb]W`U`m`j`]U`Y`]h`Y`f`Hi`fb]h]b`cf`U`A`cc`X`Y`  
Ugg][`ba`Yb`h`i`h`]b`g`h`U`b`V`W`g`k` \Y`f`Y`h`l`g`]g`b`ch`d`c`g`g]V`Y`z`]h`k`]`V`Y`g`h`U`h`X`i`cb`mci`f`W`ci`fg`Y`g`A`cc`X`Y`g`]h`k`]h`  
U`h`Y`fb`U`h]`Y`gi`Va`]gg]cb`X`Y`hU]`g`"

:`cf`]b`Z`c`fa`U`h]cb`cb`l`ck`hc`gi`Va`]h`Ugg][`ba`Yb`hg`i`cb`]b`Y`j`]U`A`cc`X`Y`.`h`h`d`g`#`gh`XY`b`h`i`bgk`"YXi`"Ui`#`ck`!  
gi`Va`]h`Ugg][`ba`Yb`h`a`cc`X`Y`"

## 5 WUXYa ]W< cbYgmiUbX`D`U[ ]Uf]ga

D`U[ ]Uf]ga `]g`i`g]b[ `h`Y`k`c`f`X`g`c`f`]X`Y`U`g`c`Z`c`h`Y`f`g`i`U`b`X`d`f`Y`g`Y`b`h]b[ `h`Y`a` `U`g`m`c`i`f`c`k`b`" `#`W`U`b`h`U`\_`Y`a` `U`b`m`  
Z`c`f`a`g`Z`Z`c`a` `X`Y`]V`Y`f`U`h`Y` `W`X`Y`U`h]b[ `h`c` `U`W`W`Y`X`Y`b`h`U` `m`i`W`c`d`m]b[ `Z`c`a` `U`g`c`i`f`W` `k` ]h`c`i`h`U`W`\_`b`c`k` `Y`X[ `Y`a` `Y`b`h`

I`B`G`K` `[`f`c`i`d`g`d`U[ ]Uf]ga `]b`h`c` `h`Y` `Z`c` `c`k` ]b[ `W`U`h`Y`[ `c`f`]Y`g.



- i bXYfghUbx'mci f'f][ \hg'UbX'fYgdcbg]V]h]Yg'Ug'U'gh XYbhUhl BGK
- VY'Uk UfY'cZd'U[ ]Uf]ga ž'Wc'dmf][ \hž' BGK 'Gh XYbh7cXY'cZ7cbXi W'Ubx'5W'W'dhUV'Y'I gY'cZ I BGK '⇒H'F Ygci f'W'g'Dc`]W'h
- VY'Uk UfY'cZ'Y'ghUbxUfXg'cZVY\Uj ]ci f'YI dY'W'X'cZYj Yfmcby']b'h'Y'I BGK 'W'a a i b]m
- 'cW'W'h'gYfj ]W'g'UbX'j]bZ'fa U]cb'UVci hl BGK 'UbX'I BGK '@]VfUfm

Gca Y'cZ'Y'gY'UfY'Ug'k ]''VY'ZJa ]]Uf'hc'mci ž'c'h'Y'fg'k ]''VY'bYk "; U]b]b[ 'U'gc`]X'i bXYfghUbx]b[ 'cZU''h'Y fY'U'Y'X'UgdY'W'g'cZ9@-G9'k ]''\Y'd'mci 'a U\_Y'h'Y'a cgh'cZ'mci f'gh X]Yg'Uhl BGK ""

[\h'hd.##gi V'Y'W'i \]X'Yg"'\]VfUfm'i bgk "YXi "Ui #' \]gY#\]Vci h' \]gY](#)

# 5 WUXYa ]WbZcfa Uh]cb

: cfYggYbh]U`gh XYbh]bZcfa Uh]cb fY`Uh]b[ `rc.

- fYei Yghg`Zcf`YI H`bg]cb/
- `UhY`gi Va ]gg]cbg`[ i ]XY`]bYg/
- fYj ]Yk `cZa Uf\_g/
- I BGK `<YU`h`UbX`GUZY`mdc`]WYg/
- YI Ua ]bUh]cb`dfcW`Xi fYg/
- gdYW]U`W`bg]XYfUh]cb`]b`hY`Yj YbhcZ]`bYgg`cf`a ]gUXj Ybh fY/
- gh XYbhYei ]mUbX`X]gUV`]m/
- UbX`c`hYf`YggYbh]U`UWUXYa ]W]bZcfa Uh]cbz`gYY

[\fhdg.#k k k "Ufng"i bgk "YXi "Ui #W ffYbhgh XYbhg#UWUXYa \]W\]bZcfa Uh\]cb#dfchW`g!\[ i \]XY`\]bYg#](#)

⇒ U[ Y`7fYX]h

fL

7F ⇒ CG

7F ⇒ CG`Dfcj ]XYf`7cXY.`\$\$\$- ;

5W\_bck`YX[ Ya YbhcZ7ci bhfm

K Y`UW\_bck`YX[ Y`hY`6YXY[ U`dYcd`Y`k`c`UfY`hY`fUX]h]cbU`W`ghcX]Ubg`cZ`hY`UbXg`cb`k`]\W`I`BGK  
? Ybg]b[`rcb`W]a`di`g`]g`cW]hYX"