

!

J 7 '*!)7'!5 H(L')!' ` ;#<(#; 5 ! J #\$\$!H*!=! J 4*Y)!<'!' II#: #' *)P!
:4((':)#4*+!I4(!5 H(L')!IH#\$;('P! H*!=! P! P! P!
P! >!!

!
] !+)(4*U!5 H)7!<H:LU(4; *!=! J #\$\$! 5 HL'!)7#+!:4; (+!'H+#'(>!&H)7!#*04\$O'+!(#U4(!H*!=!H! J H%!4I!)7#*L#*U!
)7H)!IH: #H)H)'+'! :4*4 5 #:!)7#*L#*U>K*!H==#)4*P!U(H87+!H*!=!+ # 5 8\$'!5 H)7' 5 H)#:HS!= '+:(#8)#4*+!4I!
' :4*4 5 #:!8(4<\$' 5 +!8(40#='!#*+U7)+!)7H)! J 4; \$=<'!=#II#: ;\$)!4!:4*O' %! J #)7!4*\$%! J 4(=+>!!

Prerequisite Quiz

S4!<'!+; ('!%4;!H('!8('8H(='!I4(!)7'!5 H)'(#H\$!)4!<'! :40' ('=!#*!)7#+!:4; (+'P!%4;! J #\$\$!)HL' !H!8(' \$# 5 #*H(%!
` ;#?>!!S7'!' ;#?! J #\$\$!:40' (!+4 5 '!<H+#:'! :4*4 5 #:+!H*!=! :HS: ;\$; +P!H+! J '\$\$!H+! 5 H*%!4I!)7'!:4* : '8)+! J '
J #\$\$!:40' (!#*!)7'!:4; (+'>!!S7'!' ;#?! J #\$\$!<'!48' *!4)' +P!+4!%4;! :H*! ;+ ' !H*%!('+4; (: '+!%4;!7HO' !H: ` ;#('=!
#*!8('O#4; +! :\$H++ '+!M)74+'!I(4 5 !, :4*!CD_D! J #\$\$!<'!' +8' :#H\$\$%! ;+ ' I; \$N>!! c 4; !5 ;+)+:4('!_D d !4(!7#U7'(!
4*!)7'!' ;#?!4!HO4#=!7HO#*U!)4!)HL' !H*4)7'(' ;#?!S7'!' ;#?! !

O>! S7'!(('` ;#('=!)'\!)I4(!)7#+:4;(+'!#+!e , *O#(4* 5 ' *)HS!H*=/H);(HS!T'+4;(:'!, :4*4 5 #:+f!<%!
S#')'*<'(U!H*!=!g' J#+!MSXgN!#+!8('))%!U44=>!S7'!SXg!'\!)!7H+' '*4;U7!('\$'OH*)!5H)'(#HS!)7H)!K!
7HO'!+8':#I#'=!)7'!:4(('+84*=#*U!:7H8)'(+!#*)!7'!:4;(+'!4;)\$#*'>!!Q'!J#\$\$!+L#8!H(4; *!=!H*!=!4 5 #)!
+4 5 '!5H)'(#H\$!M'+8';#H\$\$%)!7'!5H)'(#H\$!)H(U')'=!)4!)7'!'*O#(4* 5 ' *)HS!:\$H++NP!H*!=!+4 5 '!4I!J 7H)!J#\$\$!
<'!:40'('=!#+!H<40'!)7#+)'\!>!!Q'!J#\$\$!+8'*!=!'\)(H!:\$H++!)# 5 '!4*!)7H)!5H)'(#H\$!S7'('!J#\$\$!<'!
H==#)#4*H\$!H++#U*'=!('H=#*U+!I4(!* 'H(\$%! 'O'(%!)48#:#!J'!:40'(>!!S7'+!'('H=#*U+!J#\$\$!<'!84+)'=!
'8H(H)'\$%!4*!)7'!:4;(+'!J'<+#)'>!

1>! c4;!J#\$\$!*' '=!H!VWI;*:)#4*!4(!I#*H*:#H\$!M*4)!H!U(H87#*UN!:\$S; ;\$H)4(!I4(!+4 5 '! '\H5 +>!

C>! c4;(!IH:'W:40'(#*U!M+'!'- . ZK [!('` ;#(' 5 '*)+!<' \$4 JN!

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K)Y+!H!- . ZK [!+' 5 '+)'(h!!R4();*H)'\$%P!J'!H('!H<\$')!4!5'')!#*!8'(+4*>!! i *I4();*H)'\$%P!)7'!;*#O'(+#)%!
JH+!*4)!H<\$')!4!U')!;+!H!:\$H++!<#U!' *4;U7!)4!7H*=\$'!5 4('!)7H*!OC!8' 48\$'!H)!4*:'P!H*!=!)7'('!H('!V_!
8'48\$'!#*!)7'!:\$H++!!S7#++!)#*L+h!!] *% JH%P!J'!J#\$\$!5'')!H+!4I)' *!H+!84++#<\$'>!! . O'(!)7'!8H+)!+'O'(HS!
%'H(+P!:4*+#+)*\$%)!7'!<'+)!I' '=<H:L!I4(!)7#+:4;(+'!7H+!<' '*!

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O>! g':);(#*U6!\8\$H#**U!=#II#; ;\$)!5H)'(#H\$!*4)!'H+#\$%!'\$'H(*'=!4*!%4;(4J*!J#)7!)'\)P!U(4;8+p!')>:
1>! ,\H5+6!\H5+!+74;\$=<'!\$'H(***U!)44\$+!H+!J '\$\$!H+!H++'+5 '*!)44\$h!!Q'!'J#\$!U4!40'('!H:7!
'\H5!#*!=)8)7!#*!:\$H++>!!T'O# 'J*U!\H5+!#+!4*!'H('H!J7'('!#*W:\$H++!=#+: ;++4*!H*!=!
'\8\$H*H)#4*!H('!54+)!'II':)#O'>!k;+)'(H=#*U!H*+J '(+!4*!H!L'%!7H+!<' '*!+74J*!)4!<'!4*!'!4I!
)7'!J4(+)!JH%+)!4!\$'H(*!5H)'(#H\$!!S7'('I4('P!\H5!(O# 'J+!J#\$!<'!)7'!4*!'H('H!4I!:\$H++!J7'('!
!*4)'!P!H++4:#H)'=!8#:);('!+!4(!L'%+!J#\$!<'!84+)'=>!!");!=;(#*U!)7#+!8H*='5#;!8'(#4=P!J'!'J#\$!
<'!U4#*U!40'(!)7'!\H5+!4*!3445P!H*!=!)74+'!'+++4*+!J#\$!4I!:4;(+ 'P!<'!(':4(='!H*!=!84+)'=>!
C! j(4;8Wg'=W[#+: ;++4*+!M)7#+!)'(5P!)7'+!'J#\$!)HL'!8\$H:'!4*!3445N6!J'!'J#\$!:40'(<4)7!:\$H++#;!
H*!=!54('!'(':'*)!('\$'OH*)!H()#:\$'+!I(45!+:74\$H(\$%!@4;(*H\$+>!!j(4;8W\$'=W=#+: ;++4*+!H('!H!5#\!4I!
8('+'*)H)#4*+!H*!=!#+: ;++4*+>!!S7'!54('!:(H)#O'!%4;!:H*!<'!J#)7!)7'+!P!)7'!54('!%4;!J#\$!
U')!4;)!4I!)7'5!MH*!=!)7'!<''))'(!J#\$!<'!%4;(!U(H='N>!!R#*=#*U!#*)'('+)#*U!JH%+)!4!'*UHU'!)7'!
:\$H++!#*!=#+: ;++4*!4I!)7'+!'H()#:\$'+!J#\$!)!H:7!%4;!:(#):H\$!+L#\$\$!)7H)!J#\$!*4)!4*\$%'+4\$#=#I%!)7'!
:;((*)!#*I4(5H)#4*!<;)!J#\$!H\$+4!H#=#*!%4;(!\$'H(***U!I4(!4)7'(!:\$H++'+>!!a('+'*)H)#4*!4I!
5H)'(#H\$!#+!4*!'!4I!)7'!54+)!#*+)(;:#O'!'\$'H(***U!+%+)!5+!<' :H;+'6!

1>! j(4;8Wg'=[#+:;+4*6!)4!U#O'!#*: '*)#O'+!I4(!U#O#*U!7#U7!` ;H\$#)%!=#+:;+4*+!H*#!#*I4(5#*U!
)7'!:\$H++P!)7'+ '!J#\$!<'!U(H='=>!
C! m;#??'+!4*!] (#:\$'!T'H=#*U+6!)4!54)#OH)'!H:);H\$\$%!('H=#*U!)7'!H(#:\$'+>!^#*: '!)7#+!#+!H*!;88'(W
\$'O'\$!:4;(+'!#*O4\$O#*U!5 ;:7!=#+:;+4*P!%4;(!` ;#?!U(H='!:H*!<'!#58(40'=!<%!%4;(!'II4()+)4!
H=#!)4!)7H)!=#+:;+4*>!!S7#+!#+!H!e<'!7'('f!:\$H++!M)7#+!)'(5!)7H)!5'H*+!<'#*U!8(+ '*)! '#)7'(!#*!

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K!H=7'('!+)(#:)%)4!)7'! i *#0'(+%)!U;#='\$#*'+!4*!K*:4 5 8\$')'+!Me] *!K!#+!U#O' *!4*\$%! J 7' *!+);='*)+P!
P!7HO'!<' '*!;*H<\$'!)4!:4 5 8\$')'!:4;(+!'('` ;#(' 5 '*)+>!!] !+;<+)H*)#H\$!H 5 4; *)!4!
J 4(L! 5 ;+;!7HO'!<' '*! !<'!I4('!H88(4OH\$!I4(!+; :7!H!U(H='!#+!:4 5 8\$')'=>fN>!! " H=
U(H='+P!;*+H)#+IH:)4(%!8'(I4(5 H*: 'P!)44! 5 H*%!('=')!74;(+P! J 4(L!:4*I\$#:) +P!')>!H('!*4)!('H+4*+!I4(!H*!
#*:4 5 8\$')>!

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	!	!
F1 d!)4!ODD d!]!	
FD d!)4!FO d!] W!	
BB d!)4!BF d!	" o!	
B1 d!)4!B_ d!	"!	
BD d!)4!B0 d!	" W!	
_B d!)4!_F d!	- o!	
_1 d!)4!__ d!	-!	
_D d!)4!_0 d!	- W!	

(%)!,././2;lk1'#!#\$*4!%'\$#,(#5!+.'##'#!'lk1'P"00)%%)3\$&/)2!*)(M/#\$-././#Q!#&\$%'2!)2!k1/#!
#4..\$- ,#!

8'*)('(!&, (2/2;lk)l0\$%+, #5!\$..!#k, 3'2k#!% ,#k!0)%+.'&'lk1'!'6 J KLMCNO!Hk, 3'2k!E'\$.&1!\$23!RS+'0k&/)2#!
6), (#>!8'*)('!0)%/2;!)2k!)0\$%+, #!'0!13\$45!\$..!#k, 3'2k#!\$('(<, /('3lk)l0)%+.'&'!\$!MS/4!E'\$.&1!l)(>!>!

Hk, 3'2k#! : 1)!1\$9'!k'##'3!+)#&/9'!*)(!6 J KLMCNO5!1\$9'!#4%+&)%#!)*6 J KLMCNO5!)(!1\$9'!1\$3!0.)# 'l0)2k\$0k! : /k1!
#)% '2'! : 1)!1\$#lk'##'3!+)#&/9'!*)(!1\$3!#4%+&)%#!)*6 J KLMCNO!% , #k!#k\$4!1)% '\$23!0)%+.'&'lk1'!'E'\$.&1!
T, '#k/22\$/(!\$23!L..2'##!?'!+)(k/2;!l)!(%!)&'4!l2!k1/#!0.\$##5!/*!4), !\$('l#/0=!)(<,\$(\$2k/2'3=k'#\$%&\$!%#\$(!) \$!
+, -! /0!'\$!1 2 3!'\$405'\$6!(/!(##!) \$!57!8/0!9\$#5\$:\$!8/0!; %:\$!< 2 =>?@AB-!>7!8/0!6/!(##!) \$!8/0!; %:\$!
< 2 =>?@ABC!>!) '\$405'\$6!(/!5D7/!)!; %\$#(, !&\$':5E\$&-!B-+:#)=k?)+#%+k!8%l!k!1#4k(.k/0 \$ \$ 8. (/#1(0.L

E)2)(!6)3'!

"..!#k, 3'2k#!'2).. '3!2!\$!72/9'(#&k4!)*!6.)(\$3)!8), -3'!(0), (#'!\$(('#+)2#/-.'!*)(! =2) : /2; !23!\$31'(/2;!
k)!k1'!E)2)(!6)3'>K/).\$k/2#!)*k1'!+)./04!%\$4!/20., 3'@!+.\$;/(#%5!01'\$k/2;5!*\$-(/0\$&/)25!4/2;5!-(- '(45!k1(' \$k5!
, 2\$, &1)(U'3!\$00'##!k)!\$0\$3' %/0!%\$&'(/\$.#5!0./0='(*\$, 35!#, -%&/k/2; lk1'!#\$% '!)(\$#%/.\$(! :) (=1/2!%)('lk1\$2!)2'!
0), (#'! : /k1), &1+'(%/##/)2!*(%)!\$..!0), (#'!2#k(, 0k)(#/29).9'35!\$23!\$3/2; !\$0\$3' %/0!3/#1)2'##k4>!" ..!20/3'2k#!
)!*\$0\$3' %/0!%/#0)23, 0k! : /..! - '!(+)(k'3lk)!k1'!E)2)(!6)3'!D! "#''\$%&''''\$()'''+), F!WXWCYOZC[[[XF>Hk, 3'2k#!
) , 23!('#+)2#/-.'!*)(!9/).\$k/2; lk1'!\$0\$3' %/0!2k' ; (/k4!+)./04! : /..! - '#, -\ '0k!k)2)2\$0\$3' %/0!#20k/2#!*(%)lk1'!
E)2)(!6)3'!\$#! : '..!\$#!\$0\$3' %/0!#20k/2#!*(%)lk1'!*\$0, &4!% '% - (>!" 33/k)2\$.!/2*)(%&/)2!(; (\$3/2; lk1'!
E)2)(!6)3'!\$0\$3' %/0!2k' ; (/k4!+)./04!0\$2! - '!*), 23!\$!k1'! - "#''\$./") +.O11k+ .3+45k6+>!

"00)%%)3\$&/)2!*)(M/#\$-././#'

L*!4), <,\$./4!*)(!\$00)%%)3\$&/)2#!- '0\$, #'!)!\$!3/#\$-././k45!+.'\$##'#, -%/k!4), (!\$00)%%)3\$&/)2!. 'k'(!*)(%!
M/#\$-././k4!H'(9/0'#!k)!4), (!*\$0, &4!%' - '(1/2!\$!k/%'.4!%\$22'(!#)lk1\$&k!4), (!2'3#!0\$2!- '\$33('##'3)!M/#\$-././k4!
H'(9/0'#!3'&'(%/2'#!\$00)%%)3\$&/)2#!- \$#!3!)2!3)0, %'2k'3!3/#\$-././k/#!2!k1'!\$0\$3' %/0!
'29/(2% '2k!!L2*)(%&/)2!)2!('<, '#k/2; !\$00)%%)3\$&/)2#!/#!)0\$&'3!)2!k1'!M/#\$-././k4!H'(9/0'#! : '-#&/>!6)2k\$0k!
M/#\$-././k4!H'(9/0'#!\$!WXWCYOZC]B^N!)(!3#/(2*)_0.)(\$3)>'3, !*)(, (k1'(!\$##/##k\$20'>!L*!4), !1\$9'!\$!k'%)(\$4!
% '3/0\$.!0)23/k/25!# '!' '%+)\$(\$4!G'3/0\$.!6)23/k/2#!)2!k1'!M/#\$-././k4!H'(9/0'#! : '-#&/>!
!

6.##()%!8'1\$9/)(!

8)&l!#k, 3'2k#!\$23!*\$0, &4!\$(('#+)2#/-.'!

!

?'./;/),#!E)./3\$4#!

6\$%+,#!+)./04!(('\$3/2;!('./;/),#!)-#'(9\$20'#!('<./('#!&1\$&!*\$0, .&4!%\$='!'9'(4!'**)(&!&)!3'\$!(('\$#)2\$-.4!\$23!
 \$/(.4!:/&1!\$.!#&,3'2&#!:1)5!-'0\$,#'!)!('./;/),#!)-./;\$&/)2#5!1\$9'!0)2*/0&#!:/&1!#01'3,. '3!'S\$%#5!\$##/;2%'2&#!
)(!('<./('3!\$&&'23\$20'>&&H''!&1'!0\$%+,#!+)./04!(('\$3/2;!('./;/),#!)-#'(9\$20'#!*)(!*,..!3'&\$/.#&
 !

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A a c b a c a
 ca : l a c ab a . l
 a a