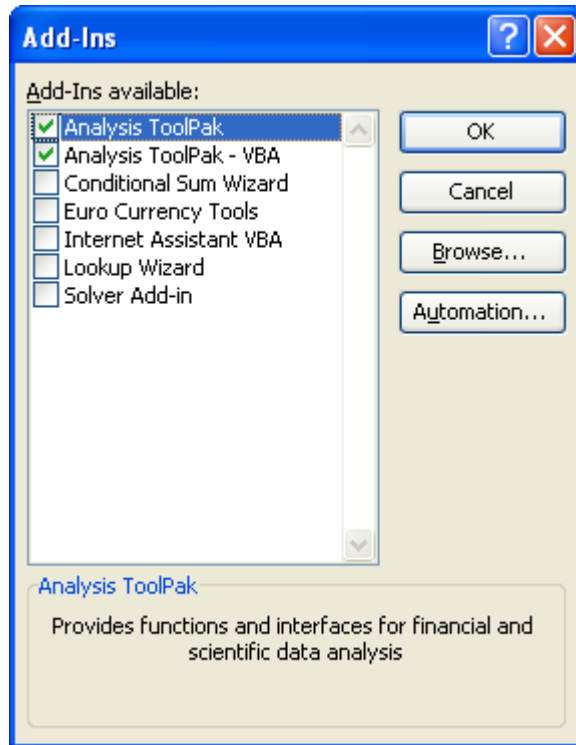
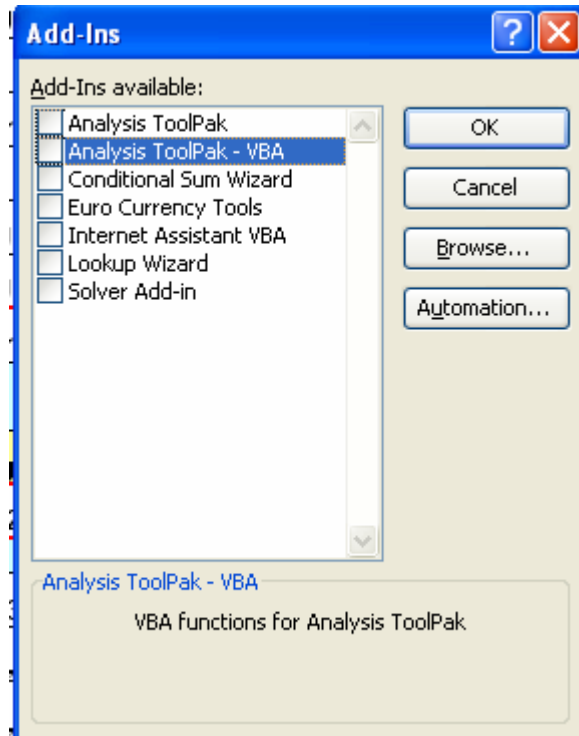


## COMPLEX CHAIN CALCULATION MANUAL

1. Open ComlexChainCalc11Mar08.xls
2. Make sure that Analysis ToolPak has been loaded in your Ms. Excel
  - On the Tools menu, click Add-Ins.



If the check box next to Analysis Toolpak is selected, it means Analysis Toolpak has been installed in your Excel. Please proceed to step 3.



If the check box next to Analysis Toolpak is not selected, it means Analysis Toolpak has not been installed in your Excel. Please load the Analysis Toolpak.

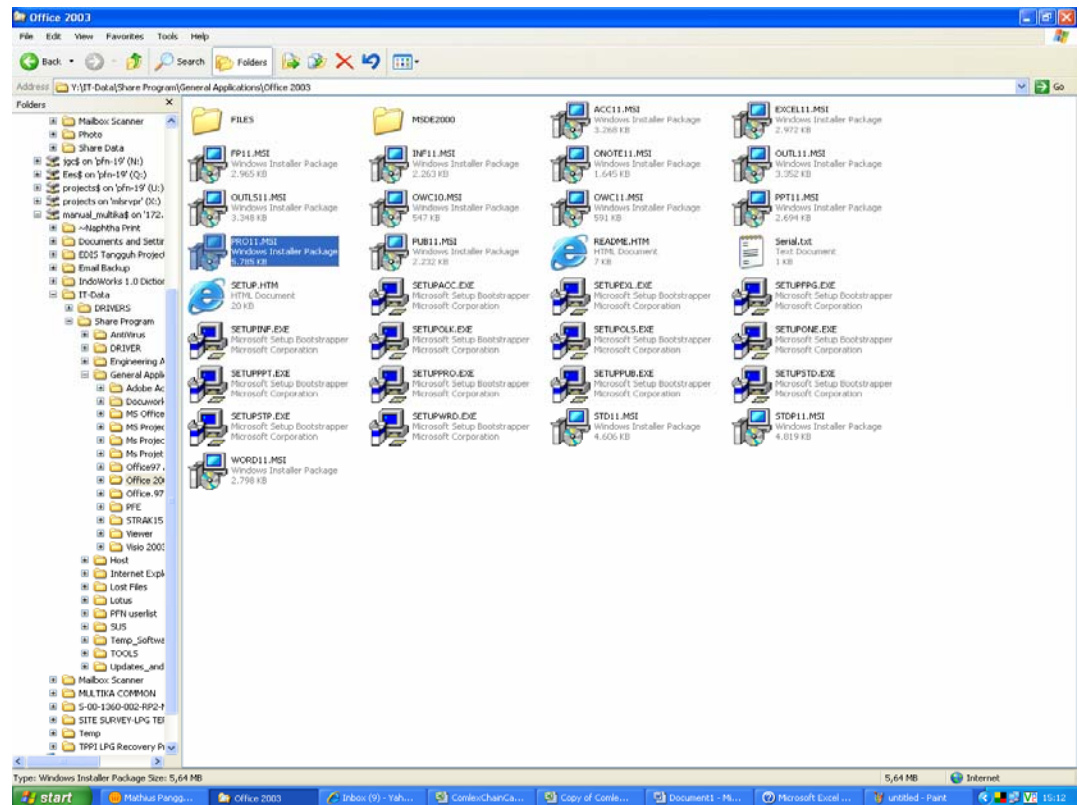
1. In the Add-Ins available box, select the check box next to Analysis Toolpak, and then click OK. Tip If Analysis Toolpak is not listed, click Browse to locate it.

**Y:\IT-Data\Share Program\General Applications\Office 2003 \ PRO11.MSI**

If your computer is not connected to drive Y yet, please run access **Multika**



**share.BAT** by click on icon **access Multika share.BAT** (location **I:\IT**)



2. If you see a message that tells you the Analysis Toolpak is not currently installed on your computer, click yes to install it.
3. Click Tools on the menu bar. When you load the Analysis Toolpak, the Data Analysis command is added to the **Tools** menu.

### 3. Function of Each Button

	Insert to A	Tag	Real	Imag
A		Vlr	-199,1858	- J 115,0000
B		Vc	84,1858	J 314,1858
C		I	-31,4186	J 8,4186
D		Total Z	5,0000	- J 5,0000
E		Xc	0,0000	- J 10,0000
F		(R)/(Xl)	5,0000	J 5,0000
G		R	10,0000	
H		Xl		J 10,0000
I				
J			0,0000	J 0,0000
X		V	-199,1858	J 115,0000

Insert	Pi
Up	Conj A
Down	
A<>B	Sqrt A
1/A	A^2
A+B	AxJ
A-B	A/J
AxB	
A/B	
A//B	Clear A
Undo	Polar

Polar to Rect	
Abs	ang. Deg
230,0000	120,0000

ang. Deg in A	-150,0000
cos	-0,866025
sin	-0,500000

Input to A

No	Function	No	Function
1	Copy Button		<b>AxB</b> : A times by B
2	Variable name (you can input the name of variable here)		<b>A/B</b> : A divide by B
3	Real value of variable		<b>A//B</b> : A parallel B
4	Imaginer Value of Variable		<b>Pi</b> : phi
5	Calculation and Edit Button		<b>Conj A</b> : calculate conjugate A
	<b>Insert</b> : Insert new row		<b>A^2</b> : Quadrate A
	<b>Up &amp; Down</b> : Rearrangement of variable up or down		<b>Sqrt A</b> : square root A
	<b>A &lt;&gt; B</b> : change position of variable from Row A to Row B		<b>AxJ</b> : A time by j
	<b>1/A</b> : calculate inverse A		<b>A/J</b> : A divide by j
	<b>A+B</b> : Sum A and B		<b>Clear A</b> : Erase variable in A row
	<b>A-B</b> : A minus B		<b>Polar</b> : show polar of variable

6	Click this button to input result of Polar Converter to A row	8	Polar to Rectangular Converter
7	Angle Box	9	Row name

**Note: When we want to run mathematics operation of two variable, they shall be put in A and B row.**

4. Try to use ComlexChainCalc11Mar08.xls to solve Example (attached)

1. input R, XL
2. input voltage (230 in Abs Column, and 30 in ang. Dec column)
3. Copy R and XL, by click on the button next to R and XL
4. Click on A + B Button calculate Z

The screenshot shows a spreadsheet application with a 'Polar to Rectangular Converter' dialog box. The spreadsheet has columns A through K and rows 4 through 15. Column B is labeled 'Insert to A'. Column C is 'Tag', D is 'Real', E is 'Imag', G is 'Abs', and H is 'ang. Deg'. Row 5 has 'A' in column A, 'R' in column C, and '4,0000' in column D. Row 6 has 'B' in column A, 'XL' in column C, and 'J 3,0000' in column E. A red box with the number '3' points to the 'Insert to A' button. A red box with the number '1' points to the 'R' cell in row 5. A red box with the number '2' points to the 'Input to A' button in the 'Polar to Rect' dialog box. The dialog box has a table with columns 'Abs', 'ang. Deg', 'Real', and 'Imag'. The 'Abs' row has '230,0000' and '30,0000'. The 'Real' row has '199,1858' and 'J 115,0000'. The 'ang. Deg in A' row has 'cos' and '1,000000'. The 'sin' row has 'sin' and '0,000000'. A 'Polar to Rect' title bar is at the top of the dialog. A 'Clear A' button is at the bottom right of the dialog. A 'Polar' button is at the bottom right of the spreadsheet interface.

4

	Insert to A	Tag	Real	Imag	Abs	ang. Deg
A		XL	0,0000	J 3,0000		
B		R	4,0000	J 0,0000		
C		R	4,0000			
D		XL		J 3,0000		
E						
F						
G						
H						
I						
J						
X						

Insert	Pi
Up	Conj A
Down	
A<>B	Sqrt A
1/A	A^2
A*B	AxJ
A-B	A/J
AxB	
A/B	
A/B	Clear A
Undo	Polar

Polar to Rect

Abs	ang. Deg	Real	Imag
230,0000	30,0000	199,1858	J 115,0000

Input to A

ang. Deg in A	
cos	1,000000
sin	0,000000

5. Change to **Z**
6. Click **Input to A** button for input voltage to A row

5

	A	B	C	D	E	I	J	K														
4		Insert to A	Tag	Real	Imag		Insert	Pi														
5	A		(XL)+(R)	4,0000	J 3,0000		Up	Conj A														
6	B		R	4,0000			Down															
7	C		XL		J 3,0000		A<>B	Sqrt A														
8	D						1/A	A^2														
9	E						A+B	AxJ														
10	F						A-B	A/J														
11	G						AxB															
12	H						A/B															
13	I						A//B	Clear A														
14	J			0,0000	J 0,0000		Undo	Polar														
15	X																					
30	<table border="1"> <thead> <tr> <th colspan="2">Polar to Rect</th> </tr> <tr> <th>Abs</th> <th>ang. Deg</th> </tr> </thead> <tbody> <tr> <td>230,0000</td> <td>30,0000</td> </tr> <tr> <td colspan="2"> </td> </tr> <tr> <th>ang. Deg in A</th> <td>36,8699</td> </tr> <tr> <th>cos</th> <td>0,800000</td> </tr> <tr> <th>sin</th> <td>0,600000</td> </tr> </tbody> </table>								Polar to Rect		Abs	ang. Deg	230,0000	30,0000			ang. Deg in A	36,8699	cos	0,800000	sin	0,600000
Polar to Rect																						
Abs									ang. Deg													
230,0000									30,0000													
ang. Deg in A									36,8699													
cos									0,800000													
sin									0,600000													
31																						
32																						
33																						
34																						
35																						
36																						
37																						
38																						

Insert	Pi
Up	Conj A
Down	
A<>B	Sqrt A
1/A	A^2
A+B	AxJ
A-B	A/J
AxB	
A/B	
A//B	Clear A
Undo	Polar

Input to A

6

7. Change to **V**
8. Click **A/B** button to calculate **I**
9. Change to **I**
10. Click this button to make copy of **I**

7

	A	B	C	D	E	I	J	K
4		Insert to A	Tag	Real	Imag		Insert	Pi
5	A		From Polar	199,1858	J 115,0000		Up	Conj A
6	B		Z	4,0000	J 3,0000		Down	
7	C		R	4,0000			A<>B	Sqrt A
8	D		XL		J 3,0000		1/A	A^2
9	E						A+B	AxJ
10	F						A-B	A/J
11	G						AxB	
12	H						A/B	
13	I						A/B	Clear A
14	J						Undo	Polar
15	X							

Insert	Pi
Up	Conj A
Down	
A<>B	Sqrt A
1/A	A^2
A+B	AxJ
A-B	A/J
AxB	
A/B	
A/B	Clear A
Undo	Polar

Polar to Rect

Abs	ang. Deg
230,0000	30,0000

Input to A

ang. Deg in A	30,0000
cos	0,866025
sin	0,500000

30  
31  
32  
33  
34  
35  
36  
37  
38



10

9

	A	B	C	D	E	G	H	I	J	K
4		Insert to A	Tag	Real	Imag	Abs	ang. Deg		Insert	Pi
5	A		(V)/(Z)	45,6697	- J 5,5023	46,0000	-6,8699		Up	Conj A
6	B		R	4,0000		4,0000			Down	
7	C		XL		J 3,0000	3,0000	90,0000		A<>B	Sqrt A
8	D						#DIV/0!		1/A	A^2
9	E						#DIV/0!		A+B	AxJ
10	F						#DIV/0!		A-B	A/J
11	G						#DIV/0!		AxB	
12	H						#DIV/0!		A/B	
13	I						#DIV/0!		A/B	Clear A
14	J			0,0000	J 0,0000		#DIV/0!		Undo	Polar
15	X						#DIV/0!			

11

Polar to Rect

Abs	ang. Deg	Real	Imag
230,0000	30,0000	199,1858	J 115,0000

Input to A

ang. Deg in A	-6,8699
cos	0,992820
sin	-0,119615

11. Calculate conjugate **I** by click Conj **A** button
12. Change (**Conj I**) to **I\***
13. Repeat step 6 & 7 above

	Insert to A	Tag	Real	Imag	Abs	ang. Deg
A		V	199,1858	J 115,0000	230,0000	30,0000
B		I*	45,6697	J 5,5023	46,0000	6,8699
C		I	45,6697	- J 5,5023	46,0000	-6,8699
D		R	4,0000		4,0000	
E		XL		J 3,0000	3,0000	90,0000
F						#DIV/0!
G						#DIV/0!
H						#DIV/0!
I						#DIV/0!
J						#DIV/0!
X						#DIV/0!

Insert	Pi
Up	Coni A
Down	
A<>B	Sqrt A
1/A	A^2
A+B	AxJ
A-B	A/J
AxB	
A/B	
A/B	Clear A
Undo	Polar

**Polar to Rect**

Abs	ang. Deg	Real	Imag
230,0000	30,0000	199,1858	J 115,0000

Input to A

ang. Deg in A	30,0000
cos	0,866025
sin	0,500000

14

- Click **AxB** button to calculate **S**
- Change **(V)x(I\*)** to **S**. **S** is

	A	B	C	D	E	G	H	I	J	K
4		Insert to A	Tag	Real	Imag	Abs	ang. Deg		Insert	Pi
5	A		(V)x(I*)	8464,0000	J 6348,0000	10580,0000	36,8699		Up	Conj A
6	B		I	45,6697	- J 5,5023	46,0000	-6,8699		Down	
7	C		R	4,0000		4,0000			A<>B	Sqrt A
8	D		XL		J 3,0000	3,0000	90,0000		1/A	A^2
9	E						#DIV/0!		A+B	AxJ
10	F						#DIV/0!		A-B	A/J
11	G						#DIV/0!		AxB	
12	H						#DIV/0!		A/B	
13	I						#DIV/0!		A/B	Clear A
14	J			0,0000	J 0,0000		#DIV/0!		Undo	Polar
15	X						#DIV/0!			
30										
31										
32										
33										
34										
35										
36										
37										
38										
39										
40										
41										

Polar to Rect			
Abs	ang. Deg	Real	Imag
230,0000	30,0000	199,1858	J 115,0000

ang. Deg in A	36,8699
cos	0,800000
sin	0,600000

- 16. The real power (P), Watt
- 17. The Imaginer power (Q), VAR
- 18. The complex power (S), VA
- 19. Power Factor (PF)

**EXAMPLE:**

$$V_T = 230 \angle 30^\circ \text{ Volt}$$

$$R = 4 \text{ ohm}$$

$$X_L = 3 \text{ ohm}$$

