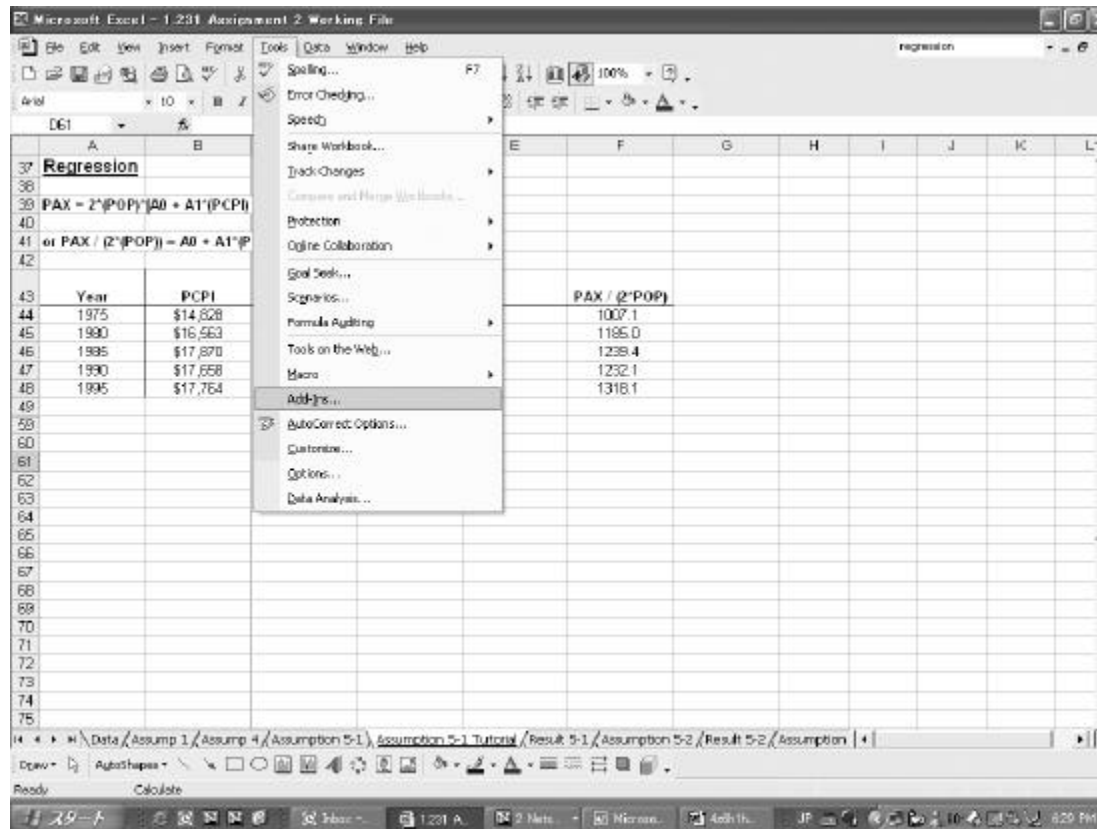


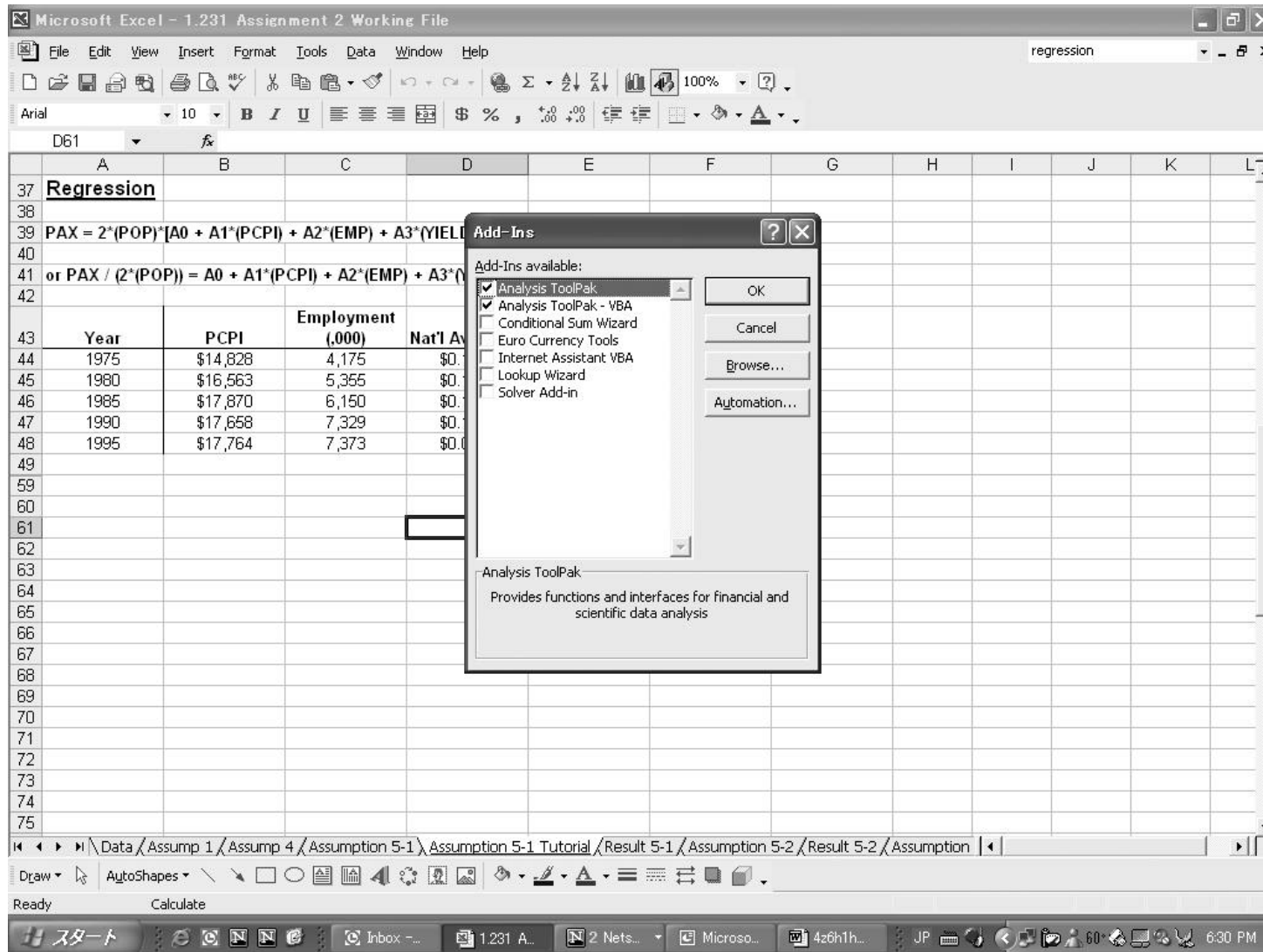
# Linear Regression with Excel© Brief Tutorial for Forecasting Assignment

MIT Airport Systems Planning Course  
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# Installation

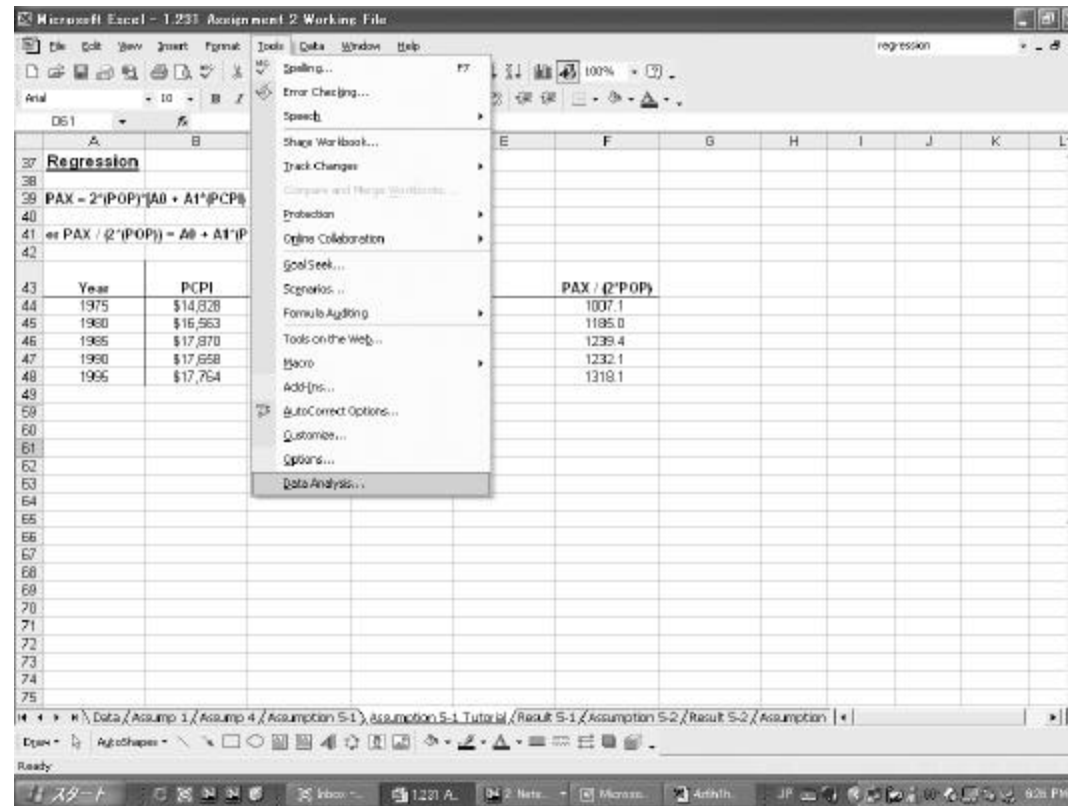


First, please make sure that you have Analysis ToolPak installed. To do so, go to: Tools... and select: Add-Ins...”  
If it is installed already, please skip to Page 4.



Make sure that: "Analysis ToolPak" is checked.

# Regression



Now we can run the regression. Go to: Tools... and select: Data Analysis

Assumption 5, Q1 is used as an example. The corresponding equation is:  
 $(PAX)/(2*(POP)) = A0 + A1*(PCPI) + A2*(EMP) + A3*(Yield)$

Microsoft Excel - 1.231 Assignment 2 Working File

File Edit View Insert Format Tools Data Window Help

regression

100%

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	A	B	C	D	E	F	G	H	I	J	K	L
37	<b>Regression</b>											
38												
39	<b>PAX = 2*(POP)*(A0 + A1*(PCPI) + A2*(EMP) + A3*(YIELD))</b>											
40												
41	<b>or PAX / (2*(POP)) = A0 + A1*(PCPI) + A2*(EMP) + A3*(YIELD)</b>											
42												
43			<b>Employment</b>									
44	<b>Year</b>	<b>PCPI</b>	<b>(,000)</b>									
45	1975	\$14,828	4,175									
46	1980	\$16,563	5,355									
47	1985	\$17,870	6,150									
48	1990	\$17,658	7,329									
49	1995	\$17,764	7,373									
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**Data Analysis**

Analysis Tools

- Exponential Smoothing
- F-Test Two-Sample for Variances
- Fourier Analysis
- Histogram
- Moving Average
- Random Number Generation
- Rank and Percentile
- Regression**
- Sampling
- t-Test: Paired Two Sample for Means

OK Cancel Help

Ready Calculate

スタート

Inbox ... 1.231 A... 2 Nets... Microso... 4z6h1h... JP 6:28 PM

From the list, select: Regression...

The screenshot shows a Microsoft Excel window with a spreadsheet titled '1.231 Assignment 2 Working File'. The spreadsheet contains a regression model and data. The regression equation is  $PAX = 2 * POP * (A0 + A1 * PCPI) + A2 * EMP + A3 * YIELD$ . The data table is as follows:

Year	PCPI	Employment (000)	Nat'l Avg Yield	PAX / (2*POP)
1975	\$14,828	4,175	\$0.1384	1007.1
1980	\$16,953	5,356	\$0.1395	1195.0
1985	\$17,870	6,150	\$0.1107	1239.4
1990	\$17,659	7,329	\$0.1008	1232.1
1995	\$17,764	7,373	\$0.0829	1318.1

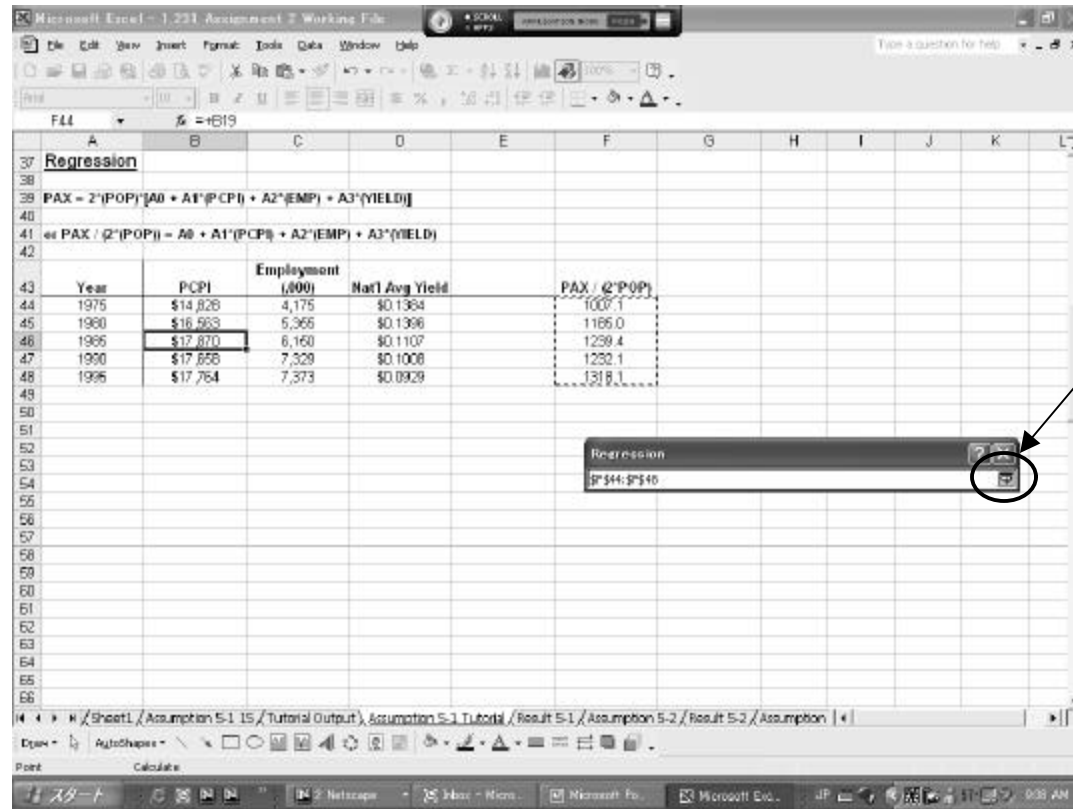
The 'Regression' dialog box is open, showing the 'Input Y Range' field set to '\$F\$4:\$F\$8' and the 'Input X Range' field set to '\$B\$4:\$D\$8'. A red circle highlights the 'Input Y Range' field, and an arrow points to it from a text box on the right.

To specify the input range, click on this button to go to range specification screen. (Next page)

You are asked to specify the input data.

- “Y Range” refers to Dependent variables
- “X Range” refers to Independent variables

For this analysis, we assume that  $PAX/(2*POP)$  is a function of PCPI, Employment, and Nat'l Avg Yield. So Column F is the Dependent variable, and Columns B-D are Independent variables.



When you are done, click on this button to go back to Regression main screen.

Here, you can select the data set you want to include as the value of Dependent or Independent variables. (Have to be done one at a time.)

- For Dependent variables, all data sets must be in one column.
- For Independent variables, data sets can be in multiple columns, and they will be your “X Variable 1,2, ... n” in the output worksheet.
- There must be the same number of data sets for Dependent and Independent variables. So please construct your table carefully.

SUMMARY OUTPUT									
Regression Statistics									
Multiple R	0.96099027								
R Square	0.92325019								
Adjusted R Square	0.69330076								
Standard Error	64.29417472								
Observations	5								
ANOVA									
	df	SS	MS	F	Significance F				
Regression	3	49778.77209	16592.92403	4.014021259	0.348004426				
Residual	1	4133.740503	4133.740503						
Total	4	53912.513							
	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95.0%	Upper 95.0%	
Intercept	-198.5019308	1035.442296	-0.191707381	0.879418261	-13354.96737	12957.96351	-13354.96737	12957.96351	
X Variable 1	0.061489507	0.057931333	1.061343995	0.48108028	-0.674599121	0.79759926	-0.674599121	0.79759926	
X Variable 2	0.039443224	0.086806662	0.454390209	0.728487693	-1.063635139	1.142421588	-1.063635139	1.142421588	
X Variable 3	977.1521176	4157.495814	0.235033819	0.85304014	-51848.61457	53802.9188	-51848.61457	53802.9188	

When you press: OK, the regression result will be shown on another worksheet. Statistics useful for our purpose are highlighted.

This example shows,  $R^2 = 0.923$ , the coefficients for the 3 independent variables and the intercept. This turns the original equation into:

$$\underline{(PAX)/(2*(POP)) = -198.50 + 0.061*(PCPI) + 0.039(EMP) + 977.15(YIELD)}$$