Homework II   41000-Business Statistics
Spring 2013   Solution

I) The DAX (Deutscher Aktien IndeX, formerly Deutscher Aktien-Index (German stock index)) is a blue chip stock market index consisting of the 30 major German companies trading on the Frankfurt Stock Exchange. We consider only 9 companies: Allianz, BMW, Continental, Daimler, Lufthansa, Münchener Rück, TUI and Volkswagen. The following statistical summaries are based on daily returns for the period between 01/01/1999 - 12/31/2007 (2347 trading days).

```
Company          mean
Allianz       -0.2691
BMW            0.2211
Continental    0.5658
Daimler       -0.1020
Lufthansa     -0.0030
Münchener Rück -0.1659
TUI           -0.2588
Volkswagen     0.3550
```

```
Covariance matrix
0.000480
0.000195 0.000390
0.000164 0.000160 0.000370
0.000228 0.000217 0.000167 0.000370
0.000214 0.000180 0.000147 0.000200 0.000450
0.000386 0.000192 0.000161 0.000213 0.000201 0.000510
0.000228 0.000183 0.000148 0.000209 0.000220 0.000224 0.000510
0.000209 0.000236 0.000167 0.000249 0.000193 0.000215 0.000192 0.000410
```

Let us consider the following three portfolios
P1: 0.25BMW +0.25Continental + 0.25Daimler +0.25 Volkswagen
P2: 0.5Allianz + 0.5MünchenerRück
P3: 0.5Lufthansa + 0.5TUI

P1 is an "Automobile" portfolio, P2 is an "Insurance" portfolio and P3 is a "Transportation & Logistics" portfolio. Compare the three portfolios in terms of mean return and standard deviations.
The following results appear in the file hw2-solution.xls on the course webpage:

| Portfolio	mean	variance	st. dev.
P1	**0.259975**	**0.000246**	**0.015676**
P2	**-0.217500**	**0.000441**	**0.020988**
P3	**-0.130900**	**0.000350**	**0.018708**

P1 has simultaneously the highest mean return and the smallest variance (or standard deviation).

II) A tool and die maker operates out of a small shop making specialized tools. He is considering increasing the size of his business and needs to know more about his costs. One such cost is electricity, which he needs to operate his machines and lights. (Some jobs require that he turn on extra bright lights to illuminate his work). He keeps track of his daily electricity costs and the number of tools that he made that day. These data are listed next.

Day	1	2	3	4	5	6	7	8	9	10
Number of tools	7	3	2	5	8	11	5	15	3	6
Electricity cost	23.80	11.89	15.98	26.11	31.79	39.93	12.27	40.06	21.38	18.65

Let X be the number of tools and Y be the electricity cost in a given day.
a) Draw the (X,Y) scatter-plot.
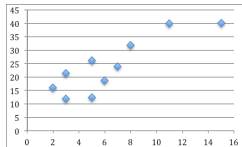
b) Compute the correlation between and X and Y. **The correlation is roughly 87%**
c) Fit the simple linear regression: Y = a + bX.
Estimated regression line: Y = 9.5878 + 2.2459X
d) Should the number of tools for the 11th day be 9, what is the estimate for the electricity cost? **If X=9, then the estimated Y is 9.5878 + 2.24589*(9), or Y = 29.8.**