

## Bus 274: Further Statistics for Business

Spring 2010

### PROBLEM SHEET # 9

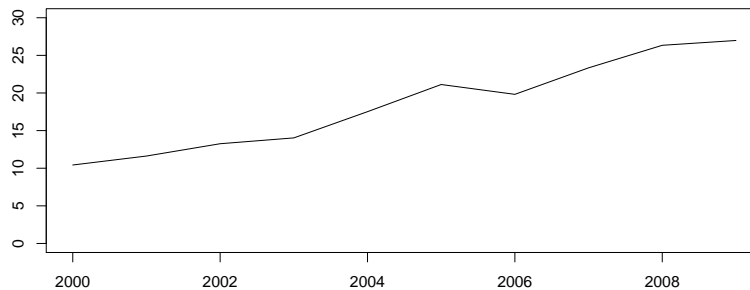
**Problem 1:** In an effort to analyze the cost of his staff, which consists of full-time and part-time employees, the manager of a restaurant uses a simple linear regression model with the weekly number of guests served (independent variable  $X$ ) and the corresponding number of working hours to serve the guests (dependent variable  $Y$ ). Data from 15 weeks are:

week	guests	hours	week	guests	hours	week	guests	hours
1	145	98	6	296	149	11	66	54
2	223	139	7	165	100	12	235	141
3	294	166	8	151	88	13	96	66
4	170	103	9	246	108	14	121	87
5	214	146	10	78	49	15	107	72

Here,  $\sum x_i = 2607$ ,  $\sum y_i = 1566$ ,  $\sum x_i^2 = 531015$ ,  $\sum y_i^2 = 182322$ ,  $\sum x_i y_i = 308313$ .

- Estimate the regression line.
- Give an interpretation of the intercept of the regression line. Why should we be careful with this interpretation?
- Give an interpretation of the slope of the regression line.
- In this example,  $R^2 = 0.89$ . Explain what this means.
- Suppose we expect 150 guests next week. How many working hours will be needed to serve them? (Give a point prediction.)

**Problem 2:** The following plot shows the annual number (million persons) of tourists coming to Turkey for the period 2000 through 2009. (Data published by *Turizm Bakanlığı* were used for this problem.)



Fitting an SLR to this series (the series of logarithms, respectively) with year  $t$  as independent variable leads to:

$$y_t = 1.9598(t - 2000) + 9.6257, \quad \ln(y_t) = 0.11112(t - 2000) + 2.3639$$

Here,  $y_t$  is the fitted number of tourists in year  $t$ .

- Which reason might there be to fit the SLR to the logged data, rather than to the data as given?
- Compute a forecast for the number of tourists coming to Turkey in 2010, one for each fitted model. Which of your forecasts would you trust?