# ST102 Class 19 – Additional exercises

1. The examination marks of 13 students in two statistics papers (a foundation paper, Paper I, and a more advanced paper, Paper II) were as follows:

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Paper I ($x$) | 65 | 73 | 42 | 52 | 84 | 60 | 70 | 79 | 60 | 83 | 57 | 77 | 54 |
| Paper II ($y$) | 78 | 88 | 60 | 73 | 92 | 77 | 84 | 89 | 70 | 99 | 73 | 88 | 70 |

   Useful summary statistics for these data are:

$$\sum x_i = 856, \quad \sum x_i^2 = 58{,}402, \quad \sum y_i = 1{,}041, \quad \sum y_i^2 = 84{,}801 \quad \text{and} \quad \sum x_i y_i = 70{,}203.$$

   (a) Calculate the sample correlation coefficient.

   (b) Determine the line of best fit of $y$ on $x$.

2. In the accompanying table, $x$ is the tensile force applied to a steel specimen in thousands of pounds, and $y$ is the resulting elongation in thousandths of an inch.

| $x$ | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|
| $y$ | 14 | 33 | 40 | 63 | 76 | 85 |

   (a) Find the equation of the least squares line.

   (b) Test $\mathrm{H}_0 : \beta_1 = 16$ vs. $\mathrm{H}_1 : \beta_1 < 16$ at the 10% significance level.

   (c) Test $\mathrm{H}_0 : \beta_0 = 0$ vs. $\mathrm{H}_1 : \beta_0 \neq 0$ at the 10% significance level.