Mathematics for Computer Science, CM0167,
Example class, Week 8,
Dr David Marshall

1. We are given the following samples of data about the average time a person spends in front of a TV per month.

$$10,\ 15,\ 22,\ 8,\ 20,\ 29,\ 32,\ 38,\ 4,\ 24,\ 34,\ 28$$

   a) What is the average time for all the people?

   b) Draw a stem-and-leaf-display for the above sample.

2. We are given the following samples of data from a measurement of the heights of stairs in office buildings.

$$9.8cm,\ 8.4cm,\ 8.8cm,\ 7.5cm,\ 10.2cm,\ 9.6cm,\ 9.1cm,\ 10.7cm,\ 7.8cm,\ 8.3cm$$

   a) What is the median value for all the heights of the stairs in the buliding?

   b) Draw a stem-and-leaf-display for the above sample.

3. Consider the ordered sample below

$$0, 1, 1, 2, 2, 3, 3, 5, 5, 6, 6, 7, 8, 9, 10, 12$$

   Calculate the

   (a) mean $\bar{x}$,

   (b) median x_{med},

   (c) the upper and lower quartile, $x_{0.25}$ and $x_{0.75}$.

   (d) the inter-quartile range, IQR.

   (e) the sample variance s^2.

   (f) the standard skewness b_3.

   (g) Draw a box-plot for the sample.

   (h) Calculate the sample variance and the mean of the sample you get after applying the linear transformation

$$y = 14x - 42$$

4. Prove the linear transformation rule: Given the transformed test series $(y_1, \ldots, y_n)$ with $y_i = ax_i + b$ we get $\bar{y} = a\bar{x} + b$ and $s_y^2 = a^2 s_x^2$.

5. A dice is thrown 4 times. What is the probability that:

   (a) Four sixes are obtained?

   (b) Four different scores are obtained?

6. A hand of 5 cards is chosen from a standard pack of 52 cards at random. What is the probability that the hand contains:

   (a) two spades

   (b) at least two black cards

7. (a) Show that ${}^{m}C_{n} = {}^{m}C_{m-n}$.

   (b) Show also ${}^{m}C_{n} = \frac{m(m-1)(m-2)\ldots(m-n+1)}{n!}$.