MATH2019 – Statistics for Civil and Environmental Engineering

Worksheet 3 – The Normal distribution

1. The file `concrete.dat` contains the compression strength (Nmm^{-2}) of 180 concrete cubes.

   Calculate the mean and standard deviation of this sample.

   Assuming that the normal distribution, with mean and standard deviation given by the sample estimates, is a good model for this variable, use tables to calculate the proportion of similar cubes with

   (i) compression strength less than 50 Nmm^{-2}

   (ii) compression strength between 60 and 70 Nmm^{-2}

   (iii) compression strength greater than 55 Nmm^{-2}

   Check your answers using MINITAB

   Use a probability plot to check whether the model seems appropriate.

2. The data in the file `water.dat` are the volumes of water used each week over a two year period for an industrial factory.

   Investigate whether a normal distribution is an appropriate model for this variable.

   If the normal distribution does not fit, try another distribution.

   Use the appropriate distribution to estimate the proportion of weeks in future, assuming no change in the general pattern of water consumption, that the factory will use more than 30 000 gallons of water.

3. The file `noise.dat` has one column of data, relating to the noise level (in decibels) exceeded 10% of exposure time at 46 sites near the Tyne and Wear Metro.

   Plot a histogram of these data.

   Test whether the data are normally distributed. What are your conclusions about the distribution of the noise variable?