## ST102 Class 11 – Additional exercises

- 1. A perfectly-machined regular tetrahedral (pyramid-shaped) die has four faces labelled 1 to 4. It is tossed twice onto a level surface and after each toss the number on the face which is downwards is recorded. If the recorded values are  $x_1$  and  $x_2$  when order matters, then the observed sample mean is  $\bar{x} = (x_1 + x_2)/2$ . Write out the sampling distribution of the sample mean as a random quantity over repeated double tosses.
- 2. A random sample of size n = 50 is drawn from the following probability density function:

$$f(x) = \begin{cases} 3(1-x)^2 & \text{for } 0 \le x \le 1\\ 0 & \text{otherwise.} \end{cases}$$

Use the central limit theorem to approximate  $P(0.225 \le \bar{X} \le 0.275)$ .

3. Let  $\{X_1, X_2, \ldots, X_9\}$  be a random sample from a normal distribution with  $\mu_X = 2$  and  $\sigma_X = 2$ . Let  $\{Y_1, Y_2, \ldots, Y_4\}$  be an independent random sample from a normal distribution with  $\mu_Y = 1$  and  $\sigma_Y = 1$ . Calculate  $P(\bar{X} > \bar{Y})$ .