MTH U481: Spring 2009: Prof. C. King

Assignment 9

Due date: Thursday March 12.

Reading: Section 4.3.

Problems:

1). p.314, #26, #29, #34.

2). p.279, #1, #7.

3). Let $X_1, \ldots, X_{10}$ be independent Poisson random variables with mean 1 (see Theorem 4.2.2 on p.281 for definitions). Use the Central Limit Theorem (see Classnotes #1 on webpage for statement) to approximate

$$P(X_1 + \cdots + X_{10} \geq 15)$$

4). Let X and Y be independent random variables with means μ_x and μ_y and variances σ_x^2 and σ_y^2, respectively. Show that

$$\mathrm{VAR}[XY] = \sigma_x^2\,\sigma_y^2 + {\mu_y}^2\,\sigma_x^2 + {\mu_x}^2\,\sigma_y^2$$

5. A well-known brand of potato can be purchased in bags of twenty. The potatoes have a random weight whose mean is 0.2 kg, and whose standard deviation is 0.05 kg.
a). Assuming the weights of potatoes are independent, find the mean and standard deviation of the *total weight* of a randomly selected bag containing 20 potatoes.
b). Assuming the weights of potatoes are independent, find the mean and standard deviation of the *average weight* of a potato in a randomly selected bag.
c). Use the normal approximation to calculate the probability that the weight of a bag exceeds 4.3 kg.