STA 2301: RISK THEORY FOR ACTUARIAL SCIENCES
CAT I

DATE: 27th February 2019 TIME: 1 HOUR

1. Given the binomial distribution function,
   (a) Find its mgf. [2 marks]
   (b) Using the result in part (a) above, calculate its mean, variance and skewness. [6 marks]
   (c) Given that $S \sim binomial(100, 0.3)$. Use the normal power approximation technique to find the 75th percentile. [5 marks]

2. Given that

$$f_1(x) = 0.5, 0.2, 0.3 \quad \text{for} \quad x = 0, 1, 2$$
$$f_2(x) = 0.3, 0.5, 0.2 \quad \text{for} \quad x = 0, 1, 2$$
$$f_3(x) = 0.2, 0.3, 0.5 \quad \text{for} \quad x = 0, 1, 2$$

   Find the mean and variance of $S = X_1 + X_2 + X_3$ [6 marks]

3. Suppose that the insurer has a linear utility function. Find the minimum premium the insurer can accept for a risk X. [4 marks]

4. Let $X \sim U(1, 3)$ and $Y \sim U(1, 2)$. Determine the distribution of $S = X + Y$. [4 marks]

5. A decision maker's utility function is given by

$$u(\omega) = -e^{-2\omega}$$

   The decision maker has two economic prospects available. The outcome of the first prospect (X) has a normal distribution with mean 6 and variance 3. The outcome of the second prospect (Y) has a normal distribution with mean 7 and variance 3.5. Which prospect is more preferrable? [3 marks]