STAT 3743, Exam II, Practice Problems. **Name _____**

1. There are 5 female and 4 male candidates in an election for electing a team of 3 city representatives. If the team is formed by choosing three candidates at random, what is the probability that there will be 2 male and 1 female representatives in this 3-member team?

2. The monthly worldwide average number of airplane crashes of commercial airlines is 2. Assume that the number of crashes each month follows a Poisson process. What is the probability that there will be more than 2 crashes in the next month?

3. Among the customers visited the auto repair shop A, 30% of them are for oil change. Each day the shop only accept 10 customers. What is probability that in a given day there will be less than 2 customers (i.e., one or none) asked for oil change out of the 10 customers?

4. For an investment, if it is successful, one will earn $1200 in profit, and if it fails, one will lose $700. If the probability that the investment will be successful is 40%, and, of course, the chance of failure is 60%, what is the expected value of this investment?

5. Let the p.m.f. of a random variable X be defined by $f(x) = \frac{x+1}{6}$, $x = 0, 1, 2$.

   a) Find $P(X \geq 1)$

   b) Find the expected value of X.

   c) Find the variance of X.

   d) Let $Y = 2X - 1$, find the expected value and variance of Y.

6. Determine which of the following functions is(are) not proper probability mass functions. (Explain)

   $f(x) = \frac{x^2}{10}$, $x = -2, -1, 1, 2$.

   $f(x) = \frac{x}{10}$, $x = -3, -2, 0, 1, 2, 3, 4, 5$.

7. Assume that the distribution of the weights of a certain type of rats is approximately normal (bell-shaped) with a mean 1.8 and standard deviation of 0.2 lbs.
   a) Approximate the percentage of this type of rats with weights between 1.5 to 2.2 lbs.

   b) Approximate the 60^{th} percentile.

8. In the study, the fear of negative evaluation (FNE) score was produced. The higher the score, the greater is the fear of negative evaluation. Suppose that the FNE scores of a population have a mean of 20 and standard deviation of 4. If a random sample of 36 individuals from this population is selected, what is the probability that the average FNE score of this sample is higher than 21.5?

9. If a balanced die is casted 30 times, what is the probability to see a 6 for 10 times or more? (Use the normal approximation to binomial probability.)