Homework 6 **Name:** _____

Elementary Statistics & Inference (STAT:1020; Bognar)

Print the pdf file, show your work in the provided space, scan pages (in order) into a single pdf file, submit in Gradescope. You may use an iPad.

1. Textbook 14.26

   (a)

   (b)

   (c)

   (d)

2. Textbook 14.27

   (a)

   (b)

3. Textbook 14.38

   (a)

(b)

4. It is known that 20% of all credit applicants have poor credit ratings. Suppose 30 applicants are randomly selected (assume independence). Let the random variable X equal the number of applicants with poor credit ratings.

   (a) What is the distribution of X? *Be sure to state all parameters.*

   (b) Find the probability that exactly 8 have poor credit.

   (c) Find $P(8 \leq X < 11)$.

   (d) On average, how many do we expect to have poor credit?

   (e) Find $SD(X)$.

   (f) Use the applet at `http://www.stat.uiowa.edu/~mbognar/applets/bin.html` to find the probability that 10 or fewer have poor credit.

   (g) Use the applet to find the probability that 7 or more have poor credit.

5. An egg manufacturer knows that 9.6% of its eggs are cracked. The eggs are packed in cartons containing 12 eggs. *Assume eggs are independent.*

(a) If the random variable X counts the total number of cracked eggs in a carton, determine the distribution of X. *Be sure to state all parameters.*

(b) Suppose a carton of eggs is randomly selected. Find the probability that exactly 3 eggs are cracked.

(c) Suppose a carton of eggs is randomly selected. Find the probability that 11 or fewer eggs are cracked.

(d) Suppose a carton of eggs is randomly selected. Find the probability that 2 or more eggs are cracked.

(e) On average, how many cracked eggs do we expect in a carton?

(f) Find $SD(X)$.

6. In reference to question (4), it is known that 20% of all credit applicants have poor credit ratings. Suppose credit applicants are repeatedly selected at random (assume independence).

   (a) Suppose the random variable X denotes the credit applicant that is the 1st to have a poor credit rating. What is the distribution of X? *Be sure to state the parameter.*

   (b) Find the probability that the 10th selected credit applicant is the 1st that has a poor credit rating.

   (c) Find the probability that the first applicant with a poor credit rating occurs on or before the 3rd selected, i.e. find $P(X \leq 3)$.

(d) Find the probability that the first applicant with a poor credit rating occurs after the 2nd selected, i.e. find $P(X > 2)$.

(e) On average, how many credit applicants must be selected to get the 1st with a poor credit rating?

(f) Find $SD(X)$.

7. In reference to question (5), an egg manufacturer knows that 9.6% of its eggs are cracked. *Assume eggs are independent.*

(a) Suppose eggs are repeatedly selected at random. If the random variable X records the egg that is first cracked, determine the distribution of X.

(b) Suppose eggs are repeatedly selected at random. Find the probability that the 10^{th} selected egg is the 1^{st} cracked egg.

(c) On average, how many eggs must be selected to get the first cracked egg?

(d) Suppose eggs are repeatedly selected at random. Find the probability that the 10^{th} selected egg is the 2^{nd} cracked egg. *This one is a little more challenging — we can not use a Geometric distribution — compute this the old-fashioned way.*