Homework 5 Problems
Section 2.4 – 6, 8, 20
Section 2.5 – 1, 2, 9

<u>Section 2.4</u>

2.4-6. It is believed that approximately 75% of American youth now have insurance due to the health care law. Suppose this is true, and let X equal the number of American youth in a random sample of $n = 15$ with private health insurance.

(a) How is X distributed?

(b) Find the probability that X is at least 10.

(c) Find the probability that X is at most 10.

(d) Find the probability that X is equal to 10.

(e) Give the mean, variance, and standard deviation of X.

2.4-8. A boiler has four relief valves. The probability that each opens properly is 0.99.

(a) Find the probability that at least one opens properly.

(b) Find the probability that all four open properly.

2.4-20. **(i)** Give the name of the distribution of X (if it has a name), **(ii)** find the values of μ and σ^2, and **(iii)** calculate $P(1 \le X \le 2)$ when the moment-generating function of X is given by

(a) $M(t) = (0.3 + 0.7e^t)^5$.

(b) $M(t) = \dfrac{0.3e^t}{1 - 0.7e^t}, \qquad t < -\ln(0.7)$.

(c) $M(t) = 0.45 + 0.55e^t$.

(d) $M(t) = 0.3e^t + 0.4e^{2t} + 0.2e^{3t} + 0.1e^{4t}$.

(e) $M(t) = \sum_{x=1}^{10} (0.1)e^{tx}$.

Section 2.5

2.5-1. In a lot (collection) of 100 light bulbs, there are five bad bulbs. An inspector inspects ten bulbs selected at random. Find the probability of finding at least one defective bulb. HINT: First compute the probability of finding no defectives in the sample.

2.5-2. On Wednesday afternoons, eight men play tennis on two courts. They know ahead of time which four will play on the north court and which four will play on the south court. The players arrive randomly at the tennis courts. What is the probability that the first four players that arrive are all assigned to **(a)** the north court, and **(b)** the same court?

2.5-9. Suppose there are three defective items in a lot (collection) of 50 items. A sample of size ten is taken at random and without replacement. Let X denote the number of defective items in the sample. Find the probability that the sample contains

(a) Exactly one defective item.

(b) At most one defective item.