Math 3680 Review #1

Review Problem 1.1 Make a boxplot for the following data set:

0 3 5 6 7 8 8 9 9 9 10 10 10 11 12 12 14 15 17 25

Remember to identify the outliers.

Review Problem 1.2 Make a histogram for the data in Problem 1.1 using the classes 0–5, 5–10, 10–20, 20–30. Be sure to use the left endpoint convention.

Review Problem 1.3 Find the (a) mean, (b) standard deviation, (c) 12.5% trimmed mean, and (d) 20% trimmed mean for the following data set:

5 8 12 13 15 16 16 27

Review Problem 1.4 A list has 80 numbers, of which the largest is 768. Suppose that the 768 is replaced by 868.

- Does the median of the list change? If yes, how much? If no, why not?
- Does the mean change? If yes, how much? If no, why not?
- Does the 10% trimmed mean change? If yes, how much? If no, why not?

Review Problem 1.5 Give a brief interpretation of (a) median, (b) mean, (c) range, (d) standard deviation.

Review Problem 1.6 Two dice are rolled. The first has 2 red faces and 4 green faces. The second has 3 red faces and 3 green faces.

1. What is the chance of getting 1 red and 1 green?
2. What is the chance of getting 2 reds?
3. What is the chance of getting 2 greens?

Review Problem 1.7 Suppose $P(E \mid F) = 0.2$, $P(F \mid E) = 0.4$, and $P(E \cap F) = 0.1$.

1. Find $P(F)$.
2. Find $P(E' \mid F')$.

Review Problem 1.8 Two independent events occur with probabilities 0.1 and 0.3. What is the probability that

1. Neither occurs
2. At least one occurs
3. Both occur
4. Exactly one occurs

Review Problem 1.9 A cereal company puts a prize in 95% of their boxes. If you buy one box every week for a year, find the chance that you will collect at least 50 prizes.

Review Problem 1.10 Two cards are dealt from a well-shuffled deck. Find the probability that the first is an ace or the second is a jack.

Review Problem 1.11 Suppose 1000 raffle tickets are sold, of which 50 are winning tickets, and you purchase 10. Let X be the number of winning tickets that you purchase.

1. What is probability that you will have exactly 2 winning tickets?
2. Find the mean and standard deviation of X.

Review Problem 1.12 Find the mean and standard deviation of a random variable X which satisfies $P(X = 2) = 0.2$, $P(X = 4) = 0.5$, and $P(X = 5) = 0.3$.

Review Problem 1.13 You go to a beach party. Two of you are bringing coolers with sandwiches. Your cooler has 10 ham sandwiches and 5 cheese sandwiches. The other cooler has 3 ham sandwiches and 17 cheese sandwiches. Someone chooses a cooler at random and then takes a sandwich at random. What is the probability that the sandwich is a cheese sandwich?

Review Problem 1.14 Suppose that $P(A) = 0.2$, $P(B) = 0.4$, $P(C) = 0.5$, $P(A \cap B) = 0.12$, $P(A \cap C) = 0.14$, $P(B \cap C) = 0.23$, and $P(A \cap B \cap C) = 0.08$. Calculate the following:

- $P(A' \cap B' \cap C')$
- $P(A \cup C)$
- $P(A \mid B \cup C)$
- $P(B \cup C \mid A)$

Review Problem 1.15 A system of electrical components is deviced as follows:

- There are two parallel subsystems A and C.
- Subsystem A consists of Component 1 and Subsystem B, in series.
- Subsystem B consists of Component 2 and Component 3 in parallel.
- Subsystem C consists of Component 4 and Component 5 in series.

Please refer to the accompanying solution video if you're having difficulty drawing this system of components.

The components work independently of one another so that $P(\text{component works}) = 0.95$. Find the probability that the system works.