Practice Problems for Chapter 6

OpenIntro P.179 # 5.2,5.3,5.5

For each problem, make sure to define the random variable, check any relevant conditions, and state the distribution before calculating the probabilities/finding percentiles

1. Suppose that 40% of all students buy snacks at school and 70 students are selected at random. Use the normal approximation for the binomial distribution to estimate the probability that at most 20 of the students in the sample buy snacks at school.

   (a) 0.0069 (b) 0.0213 (c) 0.0336 (d) 0.1734

2. The ozone hole area varies from day to day. In 2012 was 17.9 with a standard deviation of 5.6 (in million square km). Suppose 33 days are selected at random and the ozone hole is measured each day

   (a) What is the probability the mean ozone hole area in this sample is less than 15.5 million square km?

   (a) 0.0069 (b) 0.0613 (c) 0.3341 (d) 0.5162

   (b) How large will the average ozone hole area be if the sample is the largest 10% of all sample means? (a) 10.3 (b) 16.1 (c) 19.1 (d) 24.2

3. It is estimated that 2.4% of all Canadians have visited a food bank to supplement their daily food requirements. If the proportion of food bank users in Victoria is the same as the national rate, what is the probability that a sample of 600 people would have more than 17 that have used the food bank? What does your result suggest about the proportion of food bank users in Victoria?

   (a) 0.7560 (b) 0.1328 (c) 0.0214 (d) 0.2440

4. A national survey reports that 25% of telephone users no longer use landlines and have switched entirely to cell phone use. Suppose we take a SRS of 36 people.

   (a) What is the probability that the sample proportion is between 20% and 30%?

   (a) 0.9713 (b) 0.8642 (c) 0.5116 (d) 0.7342

   (b) What is the 20th percentile of sample proportions for the sample of 36?

   (a) 0.69 (b) 0.1893 (c) 0.1134 (d) 0.3107

   (c) What will the proportion of households be for samples that are in the most extreme 1% (in either direction)?

   (a) Less than -2.33% or more than 2.33% (b) more than 43.6% or less than 6.4%
   (c) Between 11.6% and 38.4% (d) Less than 1.2% or more than 48%

5. Market research claims that 46% of all comic book fans are female. A writer believes that figure is higher for comics with a lead female character and takes a random sample of 500 subscribers to female-lead comics and found that more than 265 were female. Based on these results, would you believe the proportion is higher than 46% for female lead comics? Justify your answer using probability.

   (a) 0.0008 (b) 0.0034 (c) 0.0277 (d) 0.0803

6. Assume that the average systolic blood pressure for health adults has a mean of 120 mmHg and a standard deviation of 5.6 mmHg.

   (a) What is the probability that a randomly selected person has systolic blood pressure of more than 130 mmHg?

   (a) 0.9779 (b) 0.0371 (c) 0.1734 (d) 0.0201

   (b) What is the cut off of systolic blood pressure for a person in the highest 5%?

   (a) 129.2 (b) 110.3 (c) 1.64 (d) 133.3

   (c) What is the probability that a sample of 20 healthy adults will have average systolic blood pressure of more than 124 mmHg?

   (a) 0.0007 (b) 0.2389 (c) 0.0239 (d) 0.5712

   (d) What is the probability that a sample of 30 healthy adults has average systolic blood pressure between 117.5 and 122.5 mmHg

   (a) 0.6310 (b) 0.9375 (c) 0.9855 (d) 0.9999

7. A manager at Bolen books claims that shoppers spend an average of $30 per visit with a standard deviation of $8. If this average were true, what would be the probability of having a sample of 49 shoppers that spends an average of less than $28? What does this tell you about the claim made by the manager?

   (a) 0.0401 (b) 0.0211 (c) 0.1724 (d) 0.4003