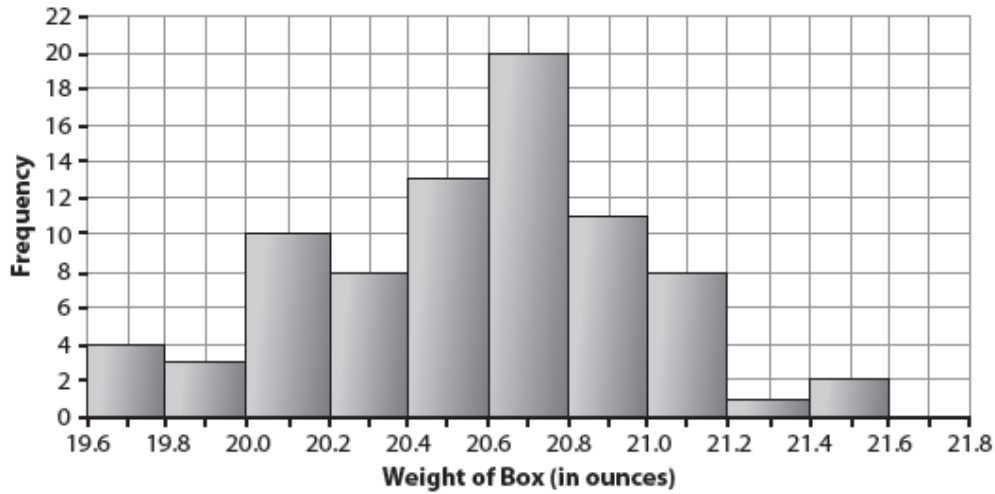


Practice Normal Distributions

1. Assume that the distribution of weights of cereal boxes is approximately normal. The histogram below shows the actual weights (in ounces) of 80 boxes of cereal. The mean weight of these boxes of cereal is 20.6 ounces.



- Estimate the Standard deviation of the histogram.
 - Using your estimate of standard deviation from Part a, what percentage of the weights are at least two standard deviations from the mean?
 - The labeling on the boxes of cereal indicates that the weight of each box should be 20 ounces. What percentage of these boxes weigh less than 20 ounces?
2. National results for the SAT test show that for college-bound seniors the average combined SAT Writing, Math and Verbal score is 1500 and the standard deviation is 250. National results for the ACT test show that for college-bound seniors the average composite ACT score is 20.8 and the standard deviation is 4.8. Your SAT score: 1860. Your neighbor's ACT: 29.

Who did better on their respective test?

3. Cholesterol levels in American women can be described by a Normal model with mean =188 mg/dL and a standard deviation of 24 mg/dL. A family physician decides to prescribe a cholesterol reducing drug to female patients who are above the 90th percentile of the cholesterol level for American women. Above what cholesterol level will the physician prescribe the drug? Show your work **OR** explain your reasoning in the box below:

4. Let x be the time required for a college student to complete a standardized exam. Suppose that for the population of students at a particular university, the distribution of x is well approximated by a normal curve with mean 45 minutes and standard deviation 5 minutes.
 - a. If 50 minutes is allowed for the exam, what proportion of students at this university would be unable to finish the exam?

 - b. How much time should be allowed for the exam if we wanted 90% of the students taking the exam to finish in the allotted time?

 - c. How much time is required for the fastest 25% of all students to complete the exam?

5. IQ tests are normally distributed with a mean score of 100 and a standard deviation of 15.
 - a. If someone has a IQ of 125, what is their percentile rank?

 - b. What percentage of IQ's lie between scores of 118 and 88? Sketch a graph to help.

 - c. What would a person's IQ score be if they were in the top 5% of all scores?

6. The batting average for major league baseball is an approximately normal distribution with a mean of 0.261 and a standard deviation of 0.034.

a. What percentage of batting averages are between 0.193 and 0.329?

b. What percentage of values are less than 0.227?

c. If a player hit 0.295 what is his percentile rank?

7. College GPA's are approximately normally distributed with a mean of 2.85 and a standard deviation of 0.2.

a. What would the GPA be for a student who is in the 16th percentile?

b. What GPA would a student have if they are in the top 2.5% of their class?

c. What percentage of students have a GPA above 3.05?

8. X is a normally distributed variable with a mean $\mu = 30$ and standard deviation $\sigma = 4$. Find the probability of each and include a sketch to represent your answer.

a. $P(x < 40)$

b. $P(x > 21)$

c. $P(30 < x < 35)$

9. A radar unit is used to measure speeds of car on a motorway. The speeds are normally distributed with a mean of 90 km/hr and a standard deviation of 10 km/hr. What is the probability that a car picked at random is traveling at more than 100 km/hr?
10. Entry to a certain University is determined by a national test. The score on this test are normally distributed with a mean of 500 and a standard deviation of 100. Tom want to be admitted to this university and he knows that he must score better than at least 70% of the students who took the test. Tom takes the test and scores 585. Will he be admitted to this university?
11. The annual salaries of employees in a large company are approximately normally distributed with a mean of \$50,000 and a standard deviation of \$20,000.
- What percent of people earn less than \$40,000?
 - What percent of people earn between \$45,000 and \$65,000?
 - What percent of people earn more than \$70,000?

12. The best male long jumpers for State College since 1973 have averaged a jump of 263 inches with a standard deviation of 14 inches. The best female long jumpers have averaged 201.2 inches with a standard deviation of 7.7 inches. This year Joey jumped 275 inches and his sister, Carla, jumped 207 inches. Both are State College students. Assume that the lengths are approximately normal. Within their groups, which athlete had the more impressive performance? Show your work.
- a. The next year a freshman at State College jumped and was in the 45th percentile. How long was the jump?
- b. The next year they improved to the 85th percentile, how long was the jump in their sophomore year?
- c. What percentage of jumpers lie between their freshman and sophomore year.