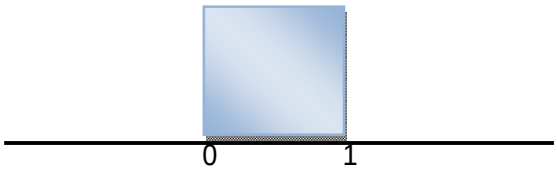
Chapter 2 Homework Problems

2.1 The figure below displays the density curve of uniform distribution. The curve takes the constant value of 1 over the interval from 0 to 1 and is zero outside the range of values. This means the data described by this distribution take values that are uniformly spread between 0 and 1. Use the area under the density curve to answer the following questions.



a. How high is the density curve?

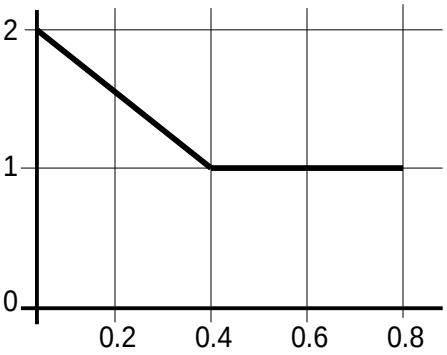
b. What percent of the observations lie above 0.8?

c. What percent of the observations lie below 0.6?

d. What percent of the observations lie between 0.25 and 0.75?

e. What is the mean μ of this distribution?

2.2 Answer the following questions based on the given density curve.



a. Verify that the graph is a valid density curve.

b. $0.6 \leq x \leq 0.8$

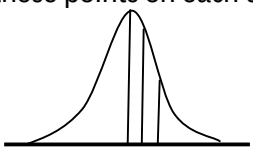
c. $0 < x < 0.4$

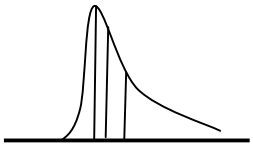
d. $0 < x \leq 0.2$

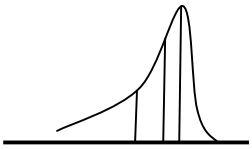
e. $x = 0.5$

f. The median of this density curve is a point between $X = 0.2$ and $X = 0.4$. Explain why.

2.3 The figure below displays three density curves, each with three points indicated. At which of these points on each curve do the mean and the median fall?







2.4 ROLL A DISTRIBUTION In this exercise you will pretend to roll a regular, six-sided die 120 times. Each time you roll the die, you will record the number of the up-face. The numbers 1, 2, 3, 4, 5, and 6 are called the **outcomes** of this chance experience.

In 120 rolls, how many of each number would you expect to roll? The TI-83 are useful devices for conducting chance experiments, especially ones like this that involve performing many repetitions. Because you are pretending to roll the die repeatedly, we call this chance experiment a **simulation**.

- Begin by clearing L_1 and L_2. Highlight L_1 with your cursor, and then press , and then e . Repeat for L_2.)
- Use your calculator's random integer generator to generate 120 random whole numbers between 1 and 6 (inclusive), and then store these numbers in L_1. (MATH, scroll to PRB, and then choose 5: RandInt.)
- Complete the command RandInt (1,6, 120)⇨ L_1 (⇨ = STO)
- Set viewing window parameters: $X[1,7]_1$ by $Y[-5,25]_5$
- Specify a histogram using the data in L_1. (2nd !)

Theoretically, what should the distribution look like? How similar was yours?

2.5 HELMET SIZES The army reports that the distribution of head circumference among male soldiers is approximately normal with a mean 22.8 inches and a standard deviation of 1.1 inches. Use the 68-95-99.7 rule to answer the following questions.

a. What percent of soldiers have a head circumference greater than 23.9?

b. A head circumference of 23.9 would be what percentile?

c. What percent of soldiers have head circumference between 21.7 inches and 23.9 inches?

2.6 IQ SCORES FOR ADULTS Wechsler Adult Intelligence Scale (WAIS) scores for young adults are $N(110, 25)$.

a. If someone scored in the 16th percentile, about what score would the individual have?

b. Answer the same question for the 84th percentile and the 97.5th percentile?

2.7 HEIGHT OF WOMEN The distribution of heights of your women aged 18-24 is approximately normal with the mean $\mu = 64.5$ and the standard deviation $\sigma = 2.5$.

a. What percent of the women are taller than 72 inches?

b. Between what heights do the middle 95% of the women fall?

c. What percent of the women have heights lower than 62 inches?

d. A height of 67 corresponds to what percentile?

2.8 A study of elite distance runners found a mean body weight of 63.1 kilograms (kg), with a standard deviation of 4.8 kg.

a. Assuming that the distribution of weights is normal, sketch the density curve of the weight distribution with the horizontal axis marked in kilograms.

b. Use the 68-95-99.7 rule to find intervals centered at the mean that will include 68%, 95%, and 99.7% of the weights of the runners.

2.9 Use Table A to find the proportion of observations from the standard normal distribution that satisfies each of the following statements. In each case, sketch the standard normal curve and shade the area under the curve that is the answer to the question.

a. $z < 2.75$

b. $z \geq 2.75$

c. $z < -1.44$

d. $-1.44 < z < 2.75$

e. $z < -.42$

f. $z \geq -.65$

g. $z < 0$

h. $-2 < z < .34$

2.10 Use Table A to find the value of *z* of a standard normal variable that satisfies each of the following conditions. (Use the value of *z* from Table A that comes closest to satisfying the condition.) In each case, sketch a standard normal curve with your value of z marked on the axis.

a. The point *z* with 42% of the data following below it.

b. The point *z* with 10% of the data following below it.

c. The point *z* with 65% of the data following below it.

d. The point *z* with 37% of the data following above it.

e. The point *z* with 58% of the data following above it.

f. Observe answers for part a. and part e.. What generalizations can be made for the values of *z* for areas whose sum is 100%?

2.11 In a recent year, the ACT scores for high school students with a 3.50 to 4.00 grade point average were normally distributed, with a mean of 24.1 and a standard deviation of 4.3. A student with a 3.5 to 4.00 grade point average who took the ACT during this time is randomly selected.

a. Find the probability that the student's ACT score is less than 20.

b. Find the probability that the student's ACT score is between 20 and 29.

c. Find the probability that the student's ACT score is more than 29.

2.12 Scores for the Wechsler Adult Intelligence Test Scale (a standard IQ test) for the ages 20 to 34 age group are approximately normally distributed with $\mu = 110$ and $\sigma = 25$.

a. What percent of the people age 20-34 have IQ scores above 100?

b. What percent have scores above 150?

c. How high of an IQ is need to be in the highest 25%?

2.13 The time per workout an athlete uses a stairclimber is normally distributed, with a mean of 20 minutes and a standard deviation of 5 minutes.

a. Find the probability that the athlete uses a stairmaster less than 17 minutes.

b. Find the probability that the athlete uses a stairmaster between 17-22 minutes.

c. Find the probability that the athlete uses the stairmast more than 28 minutes.

d. The Top 5% of all athletes are called Super Athletes? How many minutes would an athlete have to use a stairclimber in order to be recognized as a Super Athlete?

e. The Bottom 10% of all athletes are called Slackers? They are basically, wannabe athletes. How many minutes would an athlete have to use a stairclimber in order to be recognized as a Slacker?

2.14 The weights of adult male rhesus monkeys are normally distributed, with a mean of 15 pounds and a standard deviation of 3 pounds. A rhesus monkey is randomly selected.

a. Find the probability the monkey's weight is less than 13 pounds.

b. What percent of the monkeys have a weight that is greater than 20 pounds?

c. If 50 rhesus monkeys are randomly selected, about how many would you expect to weigh less than 12 pounds?

2.15 A survey was conducted to measure the number of hours per weeks adults in the United States spend on home computers. In the survey, the number of hours was normally distributed, with a mean of 7 hours and a standard deviation of 1 hour. A survey participant is randomly selected.

a. Find the probability that the hours spent on the home computer by the participant are less than 4.5 hours per week.

b. Find the probability that the hours spent on the home computer by the participant are more than 9.5 hours per week.

c. "Super Nerd" are ones who spend the most amount of time on their home computer. The top 8% of all computer users are Super Nerds. How much time does a Super Nerd spend on his/her computer each week?

d. If 350 adults in the United States are randomly selected, about how many would you expect to say they spend less than 5 hours per week on a home computer?

2.16 AHH H NUTS! Assume the mean annual consumption of peanuts is normally distributed, with a mean of 5.9 pounds per person and a standard deviation of 1.8 pounds per person. What percent of people annually consume less than 3.1 pounds of peanuts per year? Would it be unusual for a person to consume less than 3.1 pounds of peanuts per year? Explain your reasoning.

2.17 The quartiles of any density curve are the points with area of .25 and .75 to their left under the curve.

a. What are the quartiles of the standard normal distribution?

b. How many standard deviations away from the mean do the quartiles lie in any normal distribution?