

1. Determine whether each of the following variables would best be described as continuous or discrete.
  - a) The number of cars passing through an intersection in one hour.
  - b) The weight of a person shown on a scale.
  - c) The weight of a car.
  - d) The number of floors in a high-rise apartment building.
2. Make a list of all possible outcomes for gender when a family has two children. Assume that the probability of having a boy is 0.50 and the probability of having a girl is also 0.50. Find the probability of each outcome in your list.
3. Using your list of outcomes in (2).
  - a) Find the probability of having 0, 1, or 2 girls in a family of two children and display the probability distribution in a table.
  - b) Make a graph of the probability distribution.
4. Whales have one of the longest gestation periods of any mammal. According to [whalefacts.org](http://whalefacts.org), the mean gestation period for a whale is 14 months. Assume the distribution of gestation periods is Normal with a standard deviation of 1.2 months.
  - a) Find the standard score ( $z$ -score) associated with a gestational period of 12.8 months.
  - b) Would it be unusual for a whale to have a gestation period of 18 months? Explain.
5. According to the Digital Human Modeling Project, the distribution of foot lengths of women is approximately Normal with a mean of 23.1 centimeters and a standard deviation of 1.1 centimeters. In the United States, a women's shoe size of 6 fits feet that are 22.4 centimeters long. What percentage of women in the United States will wear a size 6 or smaller?
6. Suppose a shoe store stocks shoes in women's sizes 5 through 9. These shoes will fit women with feet that are 21.6 through 25 centimeters long. What percentage of women will be able to find shoes that fit in this store? Use the statistics for the mean and the standard deviation of foot length found in problem (5).
7. According to National Vital Statistics, the average length of a newborn baby is 19.5 inches with a standard deviation of 0.9 inches. The distribution of lengths is approximately Normal. Use the  $z$ -score table to answer the following. For each include an appropriately labeled and shaded Normal curve.
  - a) What is the probability that a newborn baby will have a length of 18 inches or less?
  - b) What percentage of newborn babies will be longer than 20 inches?
  - c) Baby clothes are sold in a "newborn" size that fits infants who are between 18 and 21 inches long. What percentage of newborn babies will not fit into the "newborn" size either because they are too long or too short?
8. According to the 2017 SAT Suite of Assessments Annual Report, the average ERW (English, Reading, Writing) SAT score in Florida was 520. Assume the scores are Normally distributed with a standard deviation of 100. Answer the following:
  - a) What is the probability that an ERW SAT taker in Florida scored 500 or less?
  - b) What percentage of ERW SAT takers in Florida scored between 500 and 650?
  - c) What ERW SAT score would correspond with the 40th percentile in Florida?
9. The average winter daily temperature in Chicago has a distribution that is approximately Normal, with a mean of 28 degrees and a standard deviation of 8 degrees. What

percentage of winter days in Chicago have a daily temperature of 35 degrees or warmer?

10. The weight of newborn hippopotami is approximately Normal, with a mean of 88 pounds and a standard deviation of 10 pounds.
  - a) What is the probability that a newborn hippo weighs between 90 and 110 pounds?
  - b) Suppose baby hippos that weigh at the 5th percentile or less at birth are unlikely to survive. What weight corresponds with the 5th percentile for newborn hippos?
  - c) Fiona the Hippo was born at the Cincinnati Zoo in 2017, 6 weeks premature, and weighed only 29 pounds at birth. What percentage of baby hippos are born weighing 29 pounds or less?
11. The distribution of grade point averages (GPAs) for medical school applicants in 2017 were approximately Normal, with a mean of 3.56 and a standard deviation of 0.34. Suppose a medical school will only consider candidates with GPAs in the top 15% of the applicant pool. An applicant has a GPA of 3.71. Does this GPA fall in the top 15% of the applicant pool?
12. Suppose college men's heights are approximately Normally distributed with a mean of 70.0 inches and a population standard deviation of 3 inches. What height is at the 20th percentile? Include an appropriately labeled Normal curve to support your answer.
13. College women have heights with the following distribution (inches):  $N(65, 2.5)$ .
  - a) Find the height at the 75th percentile.
  - b) Find the height at the 25th percentile.
  - c) Find the interquartile range for heights?
  - d) Is the interquartile range larger or smaller than the standard deviation? Explain.
14. According to the National Health Center, the height of 6-year-old girls are Normally distributed with a mean of 45 inches and a standard deviation of 2 inches.
  - a) In which percentile is a 5-year-old boy who is 46.5 inches tall?
  - b) If a 5-year-old boy who is 46.5 inches tall grows up to be a man at the same percentile height, what height will he be? Assume adult men's heights (inches) are distributed as  $N(69, 3)$ .
15. The average birth weight of elephants is 230 pounds. Assume that the distribution of birth weights is Normal with a standard deviation of 50 pounds. Find the birth weight of elephants at the 95th percentile.