The Normal Distribution

For all questions, assume that the distribution is normal and draw the curve

1. A survey found that mean length of time that Americans keep their cars is 5.3 years with a standard deviation of 1.2 years. If a person decides to purchase a new car, find the probability that he or she has owned the old car for
     a) less than 2.5 years
     b) between 3 and 6 years
     c) more than 7 years
     d) The length of time John keeps his car is in the 90th percentile. Determine how long John keeps his car.

2. The average waiting time at Walgreen's drive-through window is 7.6 minutes, with a standard deviation of 2.6 minutes. When a customer arrives at Walgreen's, find the probability that he will have to wait
     a) between 4 and 6 minutes
     b) less than 3 minutes
     c) more than 8 minutes
     d) Only 8% of customers have to wait longer than Mrs. Sickalot. Determine how long Mrs. Sickalot has to wait.

3. The scores on an Algebra II test have a mean of 76.4 and a standard deviation of 11.4. Find the probability that a student will score
     a) above 78
     b) below 60
     c) between 80 and 85
     d) Mr. Reeves scales his tests so that only 5% of students can receive an A. What is the minimum score Andrea can make on this test and still get an A?

4. The average life of automobile tires is 30,000 miles with a standard deviation of 2000 miles. If a tire is selected and tested, find the probability that it will have a lifetime
     a) between 25,000 and 28,000 miles
     b) between 27,000 and 32,000 miles
     c) over 35,000 miles
     d) The tire company will replace tires whose tread life falls in the lowest 15% of all tires of this model. What is the lifetime of a tire that qualifies for replacement?

5. The mean height of an American man is 69" with a standard deviation of 2.4". If a man is selected at random, find the probability that he will be
     a) between 68" and 71" tall
     b) shorter than 67"
     c) taller than 72"
     d) If Jose is in the 75th percentile, how tall is he?

Answers:

1. A survey found that mean length of time that Americans keep their cars is 5.3 years with a standard deviation of 1.2 years. If a person decides to purchase a new car, find the probability that he or she has owned the old car for

   a) less than 2.5 years   normcdf(-1E99, 2.5, 5.3, 1.2) = 0.0098 or .98%

   b) between 3 and 6 years normcdf(3, 6, 5.3, 1.2) = 0.6925 or 69.25%

   c) more than 7 years normcdf(7, 1E99, 5.3, 1.2) = 0.0783 or 7.83%

   d) The length of time John keeps his car is in the 90th percentile. Determine how long John keeps his car. invnorm(.9, 5.3, 1.2) = 6.84 years

2. The average waiting time at Walgreen's drive-through window is 7.6 minutes, with a standard deviation of 2.6 minutes. When a customer arrives at Walgreen's, find the probability that he will have to wait

   a) between 4 and 6 minutes normcdf(4, 6, 7.6, 2.6) = 0.1861 or 18.61%

   b) less than 3 minutes normcdf(-1E99, 3, 7.6, 2.6) = 0.0384 or 3.84%

   c) more than 8 minutes normcdf(8, 1E99, 7.6, 2.6) = 0.4389 or 43.89%

   d) Only 8% of customers have to wait longer than Mrs. Sickalot. Determine how long Mrs. Sickalot has to wait. invnorm(.92, 7.6, 2.6) = 11.25 minutes

3. The scores on an Algebra II test have a mean of 76.4 and a standard deviation of 11.4. Find the probability that a student will score

   a) above 78 normcdf(78, 1E99, 76.4, 11.4) = 0.4442 or 44.42%

   b) below 60 normcdf(-1E99, 60, 76.4, 11.4) = 0.0751 or 7.51%

   c) between 80 and 85 normcdf(80, 85, 76.4, 11.4) = 0.1508 or 15.08%

   d) Mr. Reeves scales his tests so that only 5% of students can receive an A. What is the minimum score Andrea can make on this test and still get an A? invnorm(.95, 76.4, 11.4) = 95.15

4. The average life of automobile tires is 30,000 miles with a standard deviation of 2000 miles. If a tire is selected and tested, find the probability that it will have a lifetime

   a) between 25,000 and 28,000 miles normcdf(25000, 28000, 30000, 2000) = 0.1524 or 15.24%

   b) between 27,000 and 32,000 miles normcdf(27000, 32000, 30000, 2000) = 0.7745 or 77.45 %

   c) over 35,000 miles normcdf(35000, 1E99, 30000, 2000) = 0.0062 or .62%

   d) The tire company will replace tires whose tread life falls in the lowest 15% of all tires of this model. What is the lifetime of a tire that qualifies for replacement? invnorm(.15, 30000, 2000) = 27,928 miles

5. The mean height of an American man is 69" with a standard deviation of 2.4". If a man is selected at random, find the probability that he will be

   a) between 68" and 71" tall normcdf(68, 71, 69, 2.4) = 0.4592 or 45.92%

   b) shorter than 67" normcdf(-1E99, 67, 69, 2.4) = 0.2023 or 20.23%

   c) taller than 72" normcdf(72, 99, 69, 2.4) = 0.1056 or 10.56%

   d) If Jose is in the 75th percentile, how tall is he? invnorm(.75, 69, 2.4) = 70.6 inches