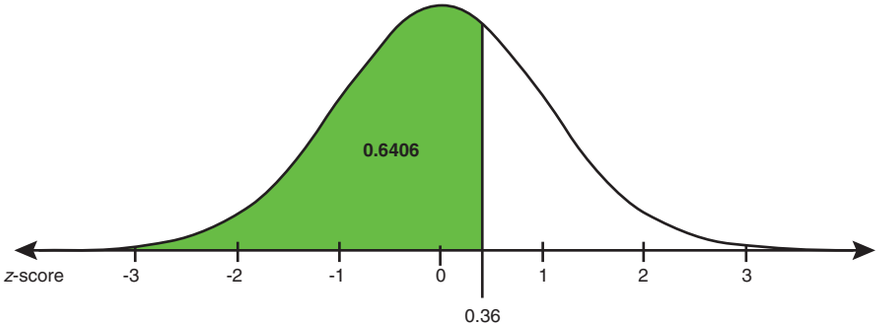
Unit 6: Statistics Lesson 6.3

Coach's Corner – V

1. Determine the area under the normal curve for each of the following regions:

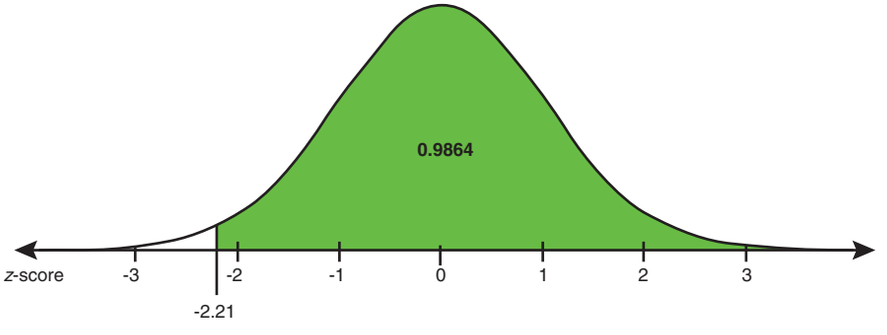
   a. below $z = 0.36$

   Determine the area using a z-score table or technology.
   0.6406



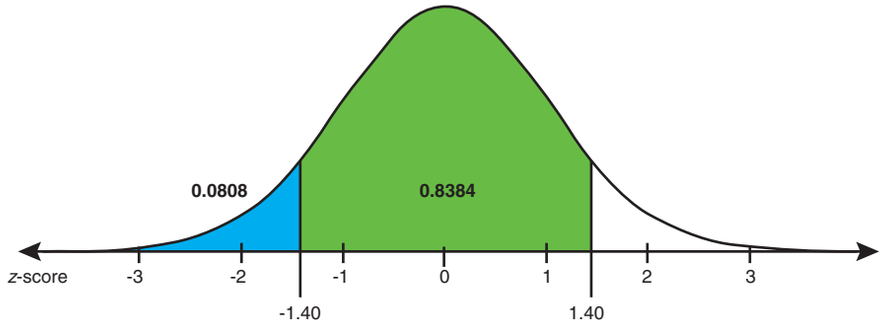
   b. above $z = -2.21$

   Determine the area using a z-score table or technology. If a z-score table is used, 0.0136 lies below a z-score of –2.21, so 1 – 0.0136 = 0.9864 lies above it.



   c. between $z = -1.40$ and $z = 1.40$

   Determine the area using a z-score table or technology. If a z-score table is used, the area to the left of $z = -1.40$ is 0.0808 and the area to the left of $z = 1.40$ is 0.9192. Find the difference in those areas to determine the area between $z = -1.40$ and $z = 1.40$.
   0.9192 – 0.0808 = 0.8384

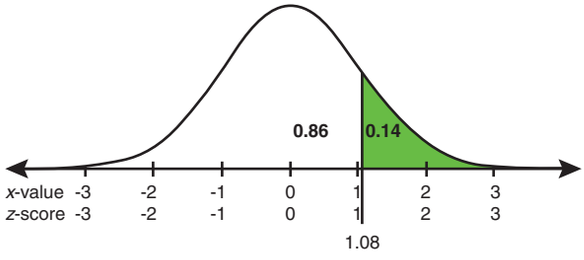


2. For a standard normal distribution, determine an x-value such that

   a. 14% of the data lies above x

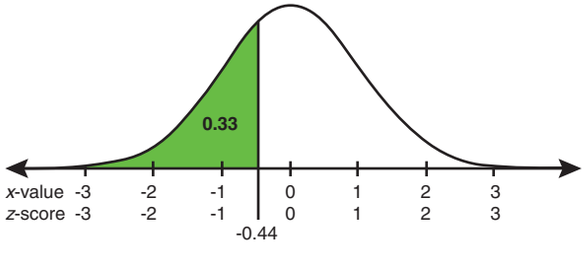
   In a standard normal distribution, the mean is 0 and the standard deviation is 1, thus all data values correspond to z-scores. Determine the value of x using a z-score table or technology. If a z-score table is used, 14% of the data is above x, so 100% – 14% = 86% of data lies below x. Find the value closest to 0.86 inside the table.

   $z = x = 1.08$



   b. 0.33 of the data lies below x

   Determine the value of x using a z-score table or technology.
   $z = x = –0.44$

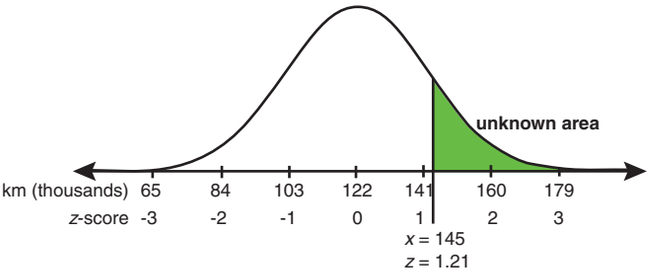


3. The timing of the first major repair, for a particular make of car, is normally distributed with a mean of 122 000 km and a standard deviation of 19 000 km.

   a. Determine the percentage of cars you expect will drive

      i. more than 145 000 km before a major repair is required.

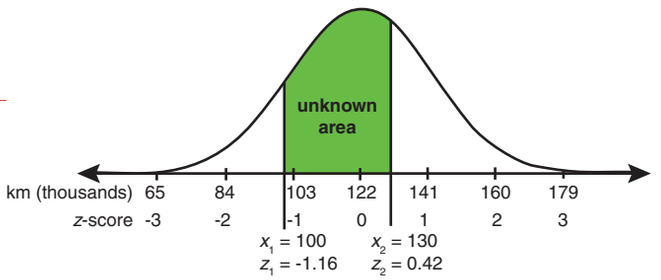
$$z = \frac{x - \mu}{\sigma}$$
$$z = \frac{145000 - 122000}{19000}$$
$$z = 1.21$$



Use technology or a z-score table to determine the area to the right of a z-score of 1.21. Approximately 11.3% of cars drive further than 145 000 km before the first major repair.

      ii. between 100 000 km and 130 000 km before a major repair is required.

$$z_1 = \frac{x_1 - \mu}{\sigma} \qquad z_2 = \frac{x_2 - \mu}{\sigma}$$
$$z_1 = \frac{100000 - 122000}{19000} \qquad z_2 = \frac{130000 - 122000}{19000}$$
$$z_1 = -1.16 \qquad z_2 = 0.42$$

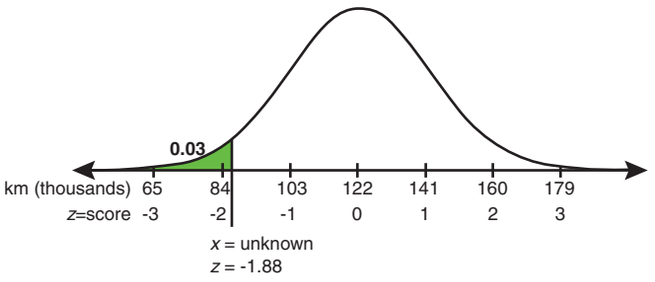


Use technology or a z-score table to determine the area between the two z-scores. If a z-score table is used, the area to the left of $z = -1.16$ is 0.1230 and the area to the left of $z = -1.16$ and $z = 0.42$.

$0.6628 - 0.1230 = 0.5398$

Approximately 54% of cars will drive between 100 000 km and 130 000 km before requiring a major repair.

b. The car company is interested in providing a warranty for new cars, but doesn't want to be responsible for repairing more than 3% of the vehicles requiring their first major repair. At how many kilometres should the company set its warranty?



Determine the z-score below which 3% of the data lies, using technology or a z-score table.

Use the z-score to determine the unknown x-value.

$$z = \frac{x - \mu}{\sigma}$$
$$-1.88 = \frac{x - 122000}{19000}$$
$$-35720 = x - 122000$$
$$86280 = x$$

3% of cars will travel less than 86 280 km before requiring a major repair. The company should set the warranty near 86 000 km.

Please complete *Lesson 6.3 Game On!* located in *Workbook 6A* before proceeding to *Lesson 6.4*.