Practice Run

1. Determine the *z*-score for a data value of 19.1 if the data set is normally distributed with a mean of 23.3 and a standard deviation of 2.4.

2. The lengths of housefly wings are normally distributed. Consider the following set of wing lengths.

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Housefly Wing Length (mm)							
3.6	4.1	4.2	4.3	4.5	4.6	4.7	4.8
3.7	4.1	4.2	4.4	4.5	4.6	4.7	4.8
3.8	4.1	4.2	4.4	4.5	4.6	4.7	4.8
3.8	4.1	4.3	4.4	4.5	4.6	4.7	4.8
3.9	4.1	4.3	4.4	4.5	4.6	4.7	4.8
3.9	4.1	4.3	4.4	4.5	4.6	4.7	4.8
4.0	4.2	4.3	4.4	4.5	4.6	4.7	4.8
4.0	4.2	4.3	4.4	4.5	4.6	4.7	4.9
4.0	4.2	4.3	4.4	4.5	4.6	4.7	4.9
4.0	4.2	4.3	4.4	4.5	4.6	4.8	4.9
Source: *http://seattlecentral.edu/qelp/sets/057/057.html*							

a. Determine the mean and standard deviation for the housefly wing length data provided.

b. What is the *z*-score of a fly that has a wing length of 4.6 mm?

c. What is the wing length of a fly that has a *z*-score of –1.3?

3. Justine competed in three races at a track and field event. Her results and the results of all of the racers are shown in the table below.

Event	Justine's Time (s)	Mean of All Racers (s)	Standard Deviation of all Racers (s)
100 m	12.5	12.7	0.7
200 m	26.5	26.8	1.3
400 m	63.4	59.7	2.5

Compared to the other racers, in which event did Justine do the best? The worst?

Compare your answers.

1. Determine the *z*-score for a data value of 19.1 if the data set is normally distributed with a mean of 23.3 and a standard deviation of 2.4.

$$z = \frac{x - \mu}{\sigma}$$
$$z = \frac{19.1 - 23.3}{2.4}$$
$$z = -1.75$$

2. The lengths of housefly wings are normally distributed. Consider the following set of wing lengths.

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Housefly Wing Length (mm)							
3.6	4.1	4.2	4.3	4.5	4.6	4.7	4.8
3.7	4.1	4.2	4.4	4.5	4.6	4.7	4.8
3.8	4.1	4.2	4.4	4.5	4.6	4.7	4.8
3.8	4.1	4.3	4.4	4.5	4.6	4.7	4.8
3.9	4.1	4.3	4.4	4.5	4.6	4.7	4.8
3.9	4.1	4.3	4.4	4.5	4.6	4.7	4.8
4.0	4.2	4.3	4.4	4.5	4.6	4.7	4.8
4.0	4.2	4.3	4.4	4.5	4.6	4.7	4.9
4.0	4.2	4.3	4.4	4.5	4.6	4.7	4.9
4.0	4.2	4.3	4.4	4.5	4.6	4.8	4.9
Source: *http://seattlecentral.edu/qelp/sets/057/057.html*							

a. Determine the mean and standard deviation for the housefly wing length data provided.

Use technology.

$\mu = 4.41$
$\sigma = 0.30$

b. What is the *z*-score of a fly that has a wing length of 4.6 mm?

$$z = \frac{x - \mu}{\sigma}$$
$$z = \frac{4.6 - 4.41}{0.30}$$
$$z = 0.63$$

c. What is the wing length of a fly that has a *z*-score of –1.3?

$$z = \frac{x - \mu}{\sigma}$$
$$-1.3 = \frac{x - 4.41}{0.30}$$
$$-1.3 \times 0.30 = x - 4.41$$
$$-0.39 = x - 4.41$$
$$4.02 = x$$

3. Justine competed in three races at a track and field event. Her results and the results of all of the racers are shown in the table below.

Event	Justine's Time (s)	Mean of All Racers (s)	Standard Deviation of all Racers (s)
100 m	12.5	12.7	0.7
200 m	26.5	26.8	1.3
400 m	63.4	59.7	2.5

Compared to the other racers, in which event did Justine do the best? The worst?

z-scores can be used to compare Justine to the group.

$$z_{100} = \frac{x_{100} - \mu_{100}}{\sigma_{100}} \qquad z_{200} = \frac{x_{200} - \mu_{200}}{\sigma_{200}} \qquad z_{400} = \frac{x_{400} - \mu_{400}}{\sigma_{400}}$$
$$z_{100} = \frac{12.5 - 12.7}{0.7} \qquad z_{200} = \frac{26.5 - 26.8}{1.3} \qquad z_{400} = \frac{63.4 - 59.7}{2.5}$$
$$z_{100} = -0.29 \qquad z_{200} = -0.23 \qquad z_{400} = 1.48$$

Justine's 100 m time has the lowest *z*-score, which means her time was below more competitors than the other events. Justine did the best in the 100 m event. Justine's 400 m time has the highest *z*-score which means her time was above more competitors than the other events. Justine did the worst in the 400 m event.