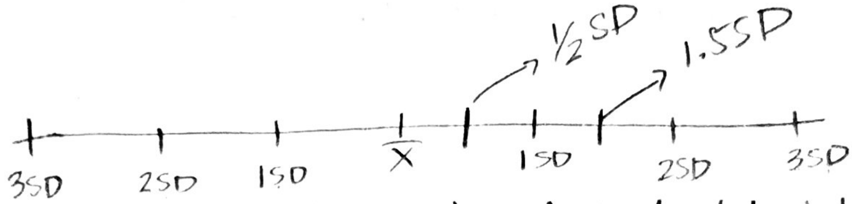
AFM - Unit 2, Statistics

Notes 2-5 Z-scores

Name ____________________

Date ____________ Period ____________



The z-score of a data point: the number of standard deviations the point is from the mean.

A z-score or z-value can be calculated for any point in data set.

To calculate the z-value for a given data point:

$$z = \frac{\text{data pt} - \text{mean}}{\text{standard dev}} \qquad z = \frac{x - \bar{x}}{Sx}$$

Ex 1: A group of students weighs 500 US pennies.
They find that the pennies have normally distributed weights with a mean of 3.1g and a standard deviation of 0.14g

a) What is the z-score for a penny that weighs 3.24g?

$$z = \frac{3.24 - 3.1}{0.14} = 1 \rightarrow$$ 3.24 is one stan.dev away from $\bar{x}$

b) What is the z-score for a penny that weighs 2.96g?

→ is one stan.dev below the mean

$$z = \frac{2.96 - 3.1}{0.14} = -1$$

c) What is the z-score for a penny that weighs 3.31g?

$$z = \frac{3.31 - 3.1}{0.14} = 1.5$$

d) What is the z-score for a penny that weighs 2.89g?

$$z = \frac{2.89 - 3.1}{0.14} = -1.5$$

A positive z-score indicates the data point lies above the mean

A negative z-score indicates the data point lies below the mean.

$$Z = \frac{x - \bar{x}}{Sx}$$

Ex. 2: For the data set in Example 1:

a.) If a penny has a z-score of .64, how much does it weigh?

$$0.64 = \frac{x - 3.1}{0.14}$$

$$0.64(0.14) = x - 3.1$$

$$0.0896 = x - \cancel{3.1}$$

$$+3.1 \quad\quad +\cancel{3}.1$$

$$x = 3.1896$$

b.) If a penny has a z-score of -2.8, how much does it weigh?

$$-2.8 = \frac{x - 3.1}{0.14}$$

$$x = 2.708$$

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