Time Frame: 50 minutes

Subject Matter: Finding Data Values Given Specific Probabilities TELL ME

Objective: TSWBAT find the probabilities for a normally distributed variable by transforming it into a standard normal variable

Standards: DA – 4.8

 Materials: PowerPoint Presentation and Worksheets

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Presentation of Information:

The teacher will discuss the following problems.

1. For a medical study, a researcher wishes to select people in the middle 60% of the population based on blood pressure. If the mean systolic blood pressure is 120 and the standard deviation is 8, find the upper and lower readings that would qualify people to participate in the study.

Solution

Assume the blood pressures are normally distributed; then cutoff points are points that are 30% below and above the mean. Note that two values are needed, one above the mean and one below the mean. Find the value to the right of the mean first. The closest z value for an area of 0.3000 is 0.84. Substituting in the formula

$$z= \frac{X- μ}{σ}$$

$$0.84= \frac{X- 120}{8}$$

$$0.84×8=X-120$$

$$0.84×8+120=X$$

$$126.72=X$$

 On the other side, z = -0.84; hence

-$0.84= \frac{X- 120}{8}$

-$0.84×8=X-120$

-$0.84×8+120=X$

$$113.28=X$$

 Therefore, the middle 60% will have blood pressure readings of 113.28 < X < 126.72.

Try these.

1. The average charitable contribution itemized per income tax return in Pennsylvania is $792. Suppose that the distribution of the contributions is normal with a standard deviation of $103. Find the limits of the middle 50% of contributions.

*Source: IRS Statistics of Income Bulletin*

1. A contractor decided to build homes that will include the middle 80% of the market. If the average size is (in square feet) of homes built is 1,810, find the maximum and minimum sizes of homes the contractor should build. Assume the standard deviation is 92 square feet and the variable is normally distributed.

*Source: Michael D. Shook and Robert L. Shook. The Book of Odds*

Classwork Date: Feb. 7, 2011

1. If the average price of a new home is $145,500, find the maximum and minimum prices of the houses a contractor will build to include the middle 80% of the market. Assume that the standard deviation of prices is $1,500 and the variable is normally distributed.

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1. If a one-person household spends an average of $40 per week on groceries, find the maximum and minimum dollar amount spent per week for the middle 50% of one-person households. Assume that the standard deviation is $5 and the variable is normally distributed.

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1. An automobile dealer finds that the average price of a previously owned vehicle is $8,256. He decides to sell cars that will appeal to the middle 60% of the market in terms of price. Find the maximum and minimum prices of the cars the dealer will sell. The standard deviation is $1,150, and the variable is normally distributed.

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