

Today:

- 1) Notes over 5.2 --- Word Problems with Normal Distributions
- 2) Complete 5.1 & 5.3 Assignment

Tomorrow:

Worksheet & Quiz over 5.1 - 5.2

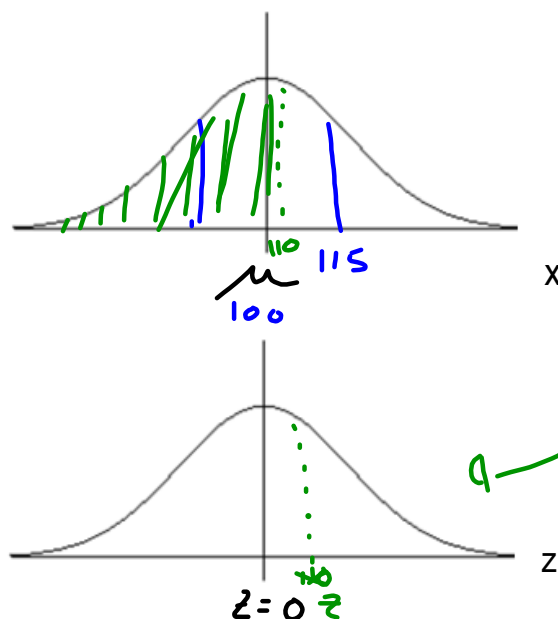
20 Worksheet , then 30 minute Quiz

## 5.2 The Standard Normal Distribution

### A. The Standard Score

To transform the random variable to a z-score, use the formula:

$$z = \frac{x - \mu}{\sigma}$$



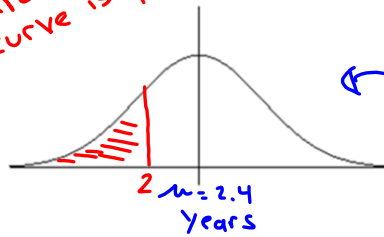
Examples:

1. A survey indicates that people use their computers an average of 2.4 years before upgrading to a new machine. The standard deviation is 0.5 year. A computer owner is selected at random. Find the probability that he or she will use it for few than 2 years before upgrading. Assume the distribution is normal.

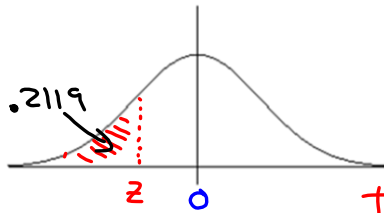
Area under curve is probability

$\mu$   
mean = 2.4

$$z = \frac{x - \mu}{\sigma}$$



$x \Rightarrow 2$   
 $\mu \Rightarrow 2.4$   
 $\sigma \Rightarrow 0.5$

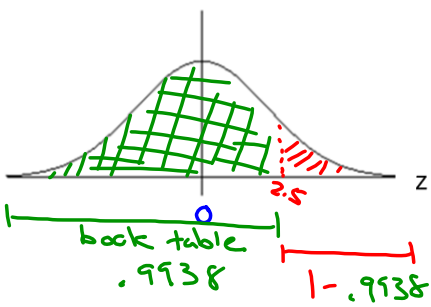
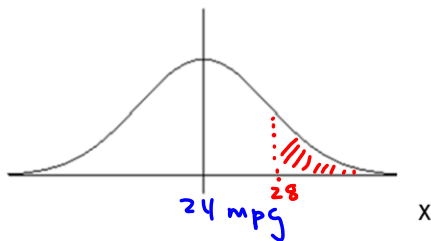


z Probability is 21.19%

$$\frac{2 - 2.4}{.5} = -0.8$$

The probability of people upgrading before 2 years is 21.19%

2. A Ford Focus manual transmission gets an average of 24 miles per gallon (mpg) in city driving with a standard deviation of 1.6 mpg. A Focus is selected at random. What is the probability that it will get more than 28 mpg? Assume that gas mileage is normally distributed.



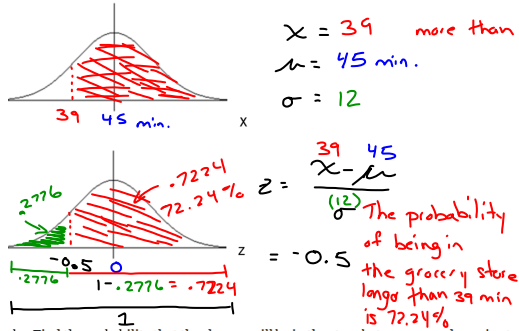
$$\frac{28 - 24}{1.6} = 2.5$$

$$z = 2.5$$

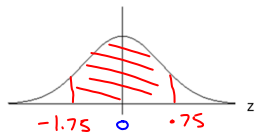
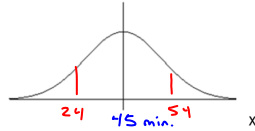
0.62% probability of getting more than 28 mpg.

3. A survey indicates that for each trip to the supermarket, a shopper spends an average of 45 minutes with a standard deviation of 12 minutes in the store. The length of time spent in the store is normally distributed. A shopper enters the store.

a. Find the probability that the shopper will be in the store more than 39 minutes.



b. Find the probability that the shopper will be in the store between 24 and 54 minutes.



$$z \Rightarrow 0.75 - -1.75$$

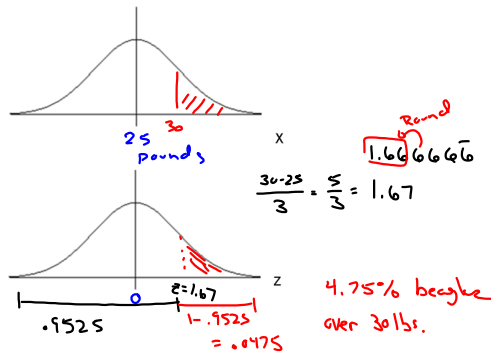
$$0.7234 - 0.0401$$

$$= 0.6833$$

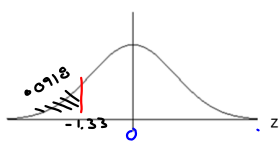
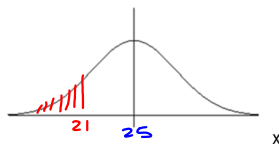
$$68.33\%$$

4. The weights of adult male beagles are normally distributed, with a mean of 25 pounds and a standard deviation of 3 pounds. A beagle is randomly selected.

a. What percent of the beagles have a weight that is greater than 30 pounds?

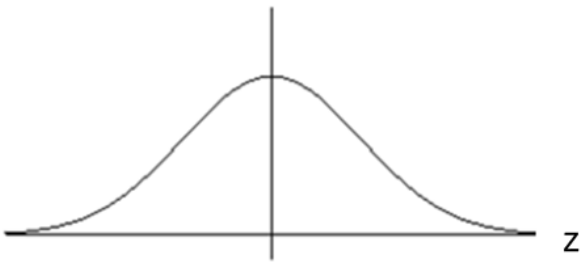
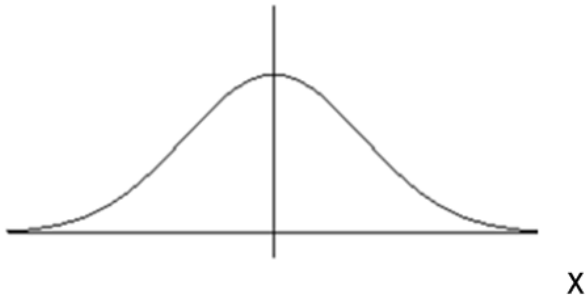


b. If 50 beagles are randomly selected, about how many would you expect to weigh less than 21 pounds?



$$\frac{21 - 25}{3} = -1.33$$

9.18% beagle less than 21 lbs

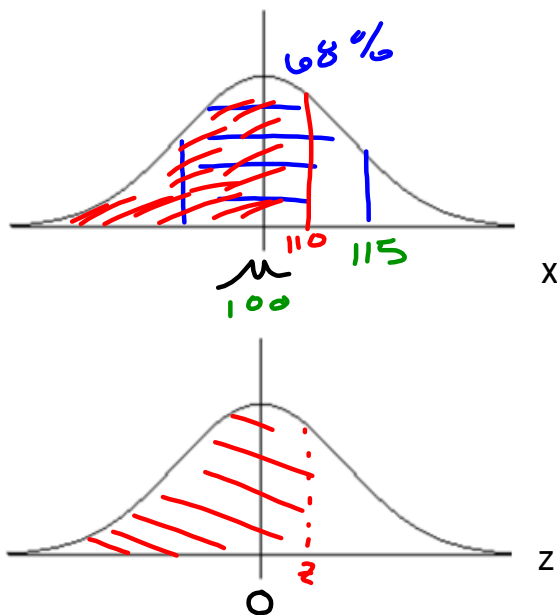


### 5.2 The Standard Normal Distribution

#### A. The Standard Score

To transform the random variable to a z-score, use the formula:

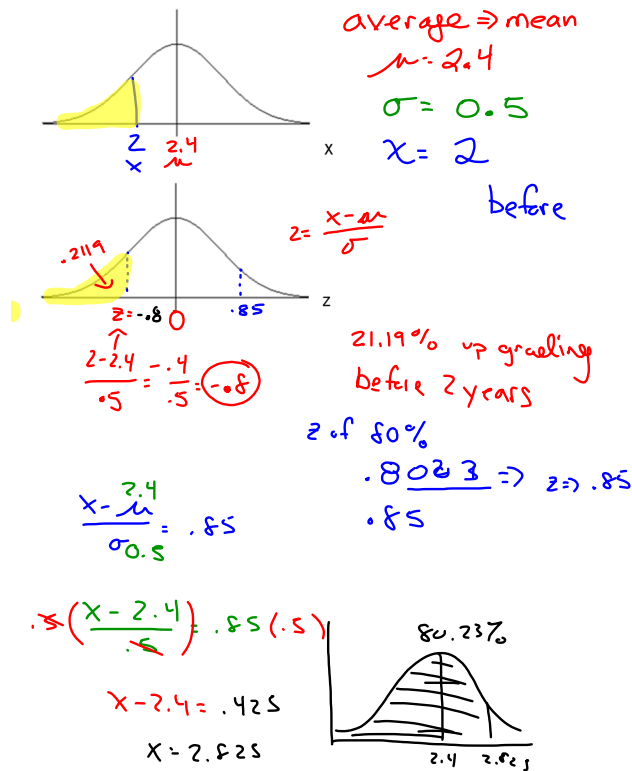
$$z = \frac{x - \mu}{\sigma}$$



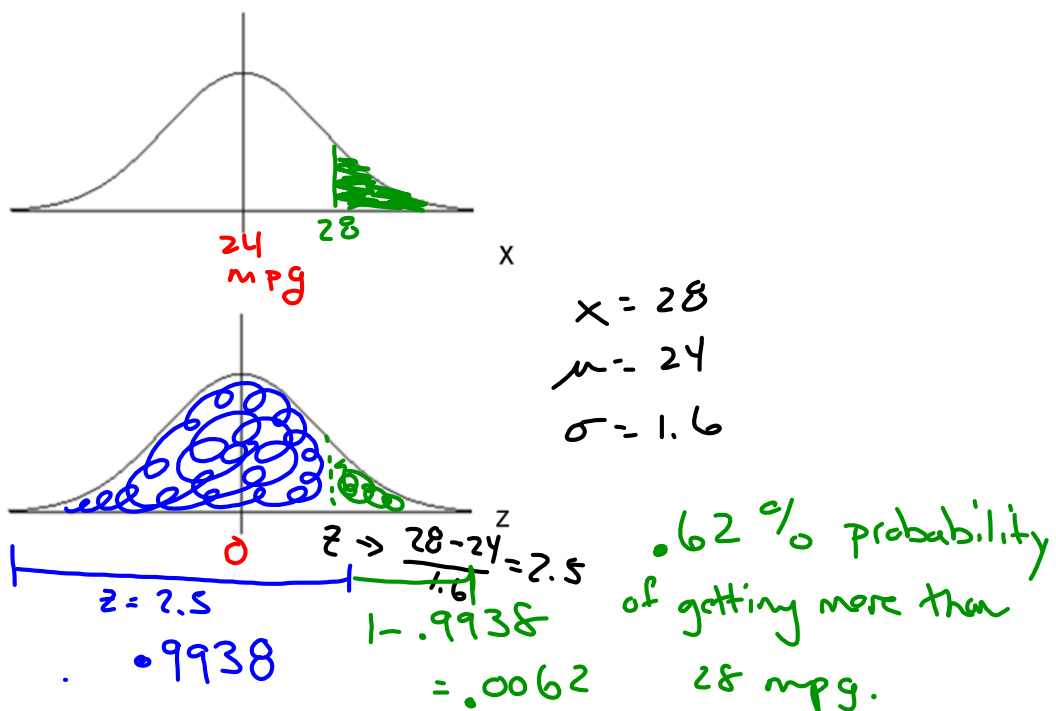
area under curve is the probability

Examples:

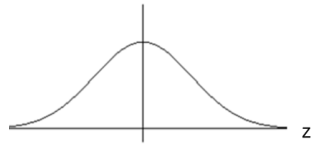
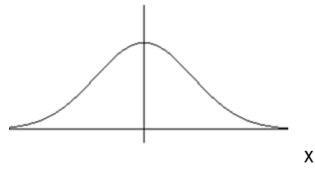
1. A survey indicates that people use their computers an average of 2.4 years before upgrading to a new machine. The standard deviation is 0.5 year. A computer owner is selected at random. Find the probability that he or she will use it for few than 2 years before upgrading. Assume the distribution is normal.



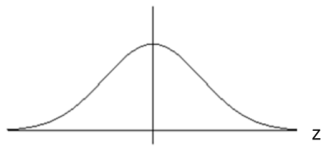
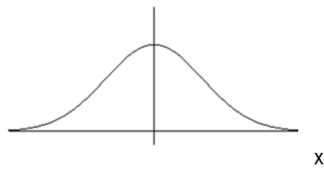
2. A Ford Focus manual transmission gets an average of 24 miles per gallon (mpg) in city driving with a standard deviation of 1.6 mpg. A Focus is selected at random. What is the probability that it will get more than 28 mpg? Assume that gas mileage is normally distributed.



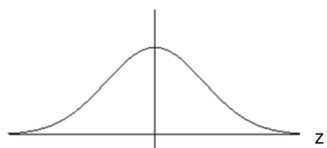
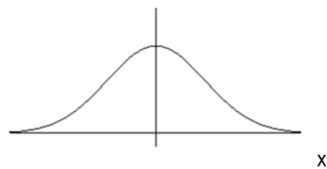
3. A survey indicates that for each trip to the supermarket, a shopper spends an average of 45 minutes with a standard deviation of 12 minutes in the store. The length of time spent in the store is normally distributed. A shopper enters the store.
- Find the probability that the shopper will be in the store more than 39 minutes.



- Find the probability that the shopper will be in the store between 24 and 54 minutes.



4. The weights of adult male beagles are normally distributed, with a mean of 25 pounds and a standard deviation of 3 pounds. A beagle is randomly selected.
- What percent of the beagles have a weight that is greater than 30 pounds?



- If 50 beagles are randomly selected, about how many would you expect to weigh less than 21 pounds?

