

## Section 5.2 - Normal Distributions: Finding Probabilities

1. Finding Normal Probabilities/Proportions: if  $x$  is normally distributed, we can find the probability that  $x$  falls in a given interval by calculating the area under the curve.
  - (a) State the problem in terms of the observed variable  $x$ .
  - (b) Convert the upper and lower bounds of the interval into  $z$ -scores. ( $\mu = 0, \sigma = 1$ )
  - (c) Use the standard normal distribution (table) to find the area.
2. Example #1:

A set of SAT scores is normally distributed with  $\mu = 890$  and  $\sigma = 120$ .

  - (a) Mike's SAT score is 770.  
Approximately what proportion of students received a score lower than Mike's?
  - (b) Art's SAT score is 1010.  
Approximately what proportion of students received a score lower than Art's?
  - (c) Joan's SAT score is 1130.  
Approximately what proportion of students received a score higher than Joan's?
  - (d) Approximately what proportion of students received a score between 650 and 890?
3. Example #2:

The length of human pregnancies from conception to birth varies according to a distributions that is approximately normal with mean 266 days and standard deviation 16 days.

  - (a) About what percentage of the pregnancies lasted less than 234 days?
  - (b) What percentage of these pregnancies last more than 290 days?
  - (c) What percentage of these pregnancies last less than 278 days?
  - (d) What percentage of these pregnancies last between 258 and 290 days?
4. Example #3:

The weights of adult male rhesus monkeys are normally distributed, with a mean of 15 pounds and a standard deviation of 3 pounds. A rhesus monkey is randomly selected.

  - (a) Find the probability that the monkey's weight is less than 13 pounds.
  - (b) Find the probability that the weight is between 13 and 17 pounds.
  - (c) Find the probability that the monkey's weight is more than 17 pounds.
  - (d)
5. Example #4:

At Halloween, a grocery store brings in a large supply of pumpkins. The mean weight is 22 pounds, and the variance is 16.

  - (a) What proportion of pumpkins weighs between 18 and 20 pounds?
  - (b) What proportion of pumpkins weighs less than 18 pounds?
  - (c) What proportion of pumpkins weighs more than 17 pounds?
  - (d) What proportion of pumpkins weighs more than 30 pounds?