1. All raw milk contains a certain strain of bacteria. Uncontaminated milk has a bacteria count per milliliter of milk that is *normally* distributed with a mean of 2500 bacteria and a standard deviation of 300 bacteria.
Let the random variable $x =$ ____________________________________ .

(a). If only *one* 1 ml of milk is tested, what is the probability that the bacteria count is between 2350 and 2650?

Do we have enough information to answer this question?

- Does the question involve a population, sample, or sample means?
- What type of distribution is it?
- Do we have the parameters (for a population) or statistics (for a sample)?

(b). If 42 random 1 ml samples of milk are tested, what is the probability that the *mean* bacteria count for the samples will be between 2350 and 2650?

Do we have enough information to answer this question?

- Does the question involve a population, sample, or sample means?
- What type of distribution is it?
- Do we have the parameters (for a population) or statistics (for a sample)?

[Stop here – see notes]

[See notes for **Central Limit Theorem**]

Back to the Milk Example:

(a). If only *one* 1 ml of milk is tested, what is the probability that the bacteria count is between 2350 and 2650?

(b). If 42 random 1 ml samples of milk are tested, what is the probability that the *mean* bacteria count for the samples will be between 2350 and 2650?

(c). If the health inspector finds that the mean bacteria count for the 42 samples is not between 2350 and 2650, what might he conclude?

[Stop Here – see notes and online demo]

2. A large apple farm packs its apples in bushels for shipping. The U.S. standard for weight of a bushel of apples is 48 lbs. Assume the population of bushel weights has a distribution with mean 48 lbs and standard deviation of 5.2 lbs.

(a). If a single bushel is randomly selected, what is the probability that it will weigh 42 lbs or lower?

(b). If a random sample of 50 bushels is selected, what is the probability that the mean weight will be 42 lbs or lower?

(c). Interpret the results of part(b).