

Handout for “Understanding Sampling Variability NCTM 2017

Is it s or is it $\frac{s}{\sqrt{n}}$?

1. The weights of full term babies born in the U.S. are normally distributed with a mean of 3500 grams and a standard deviation of 600 grams.

Would it be surprising to see a full term baby with a birth weight of 4000 grams?

Would it be surprising if the average weight of babies born during 2015 at a large urban hospital was 4000 grams?

Would it be surprising if the average weight of babies born on October 10, 2015 at a large urban hospital was 4000 grams?

Would it be surprising if the average weight of babies born on October 10, 2015 at a small rural hospital was 4000 grams?

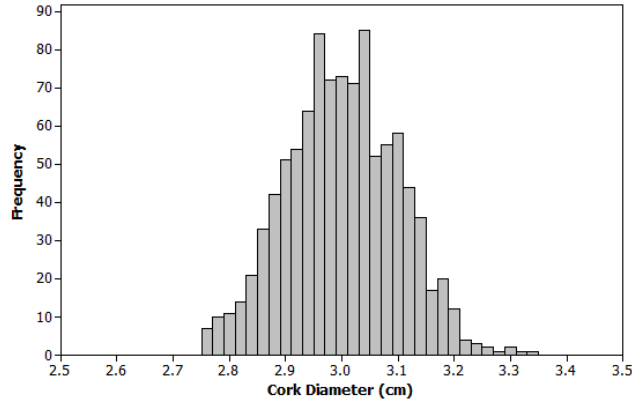
2. Suppose that you come to class unprepared and find out that there is a quiz over the material in the assigned reading. The questions on the quiz are true false and are scored as 0 points for an incorrect answer and 1 point for a correct answer. The score on the quiz is the average of the scores assigned (the proportion correct). To pass the quiz, you need to have a score of 0.7 or higher. Would you prefer that the quiz have 10 questions or that the quiz have 30 questions?
3. Suppose that there is a lot of variability in the actual weight of gold coins produced at a particular mint. The average weight of the coins produced is 1 ounce, and the standard deviation of the weights is 0.2 ounces. (This is not a very good mint!). All coins are the same price and are based on the price of 1 ounce of gold. If you get a coin that weighs less than an ounce, you will lose money, but if you get a coin that weighs more than one ounce, you actually come out ahead. You can buy either one coin or 20 coins.

Describe one reason why you might choose to only buy one coin.

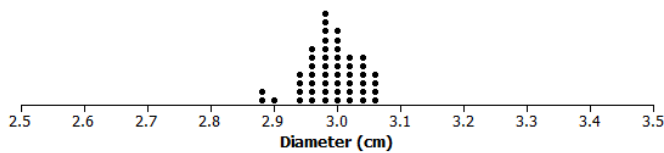
Describe one reason why you might choose to buy 20 coins.

Matching Activity

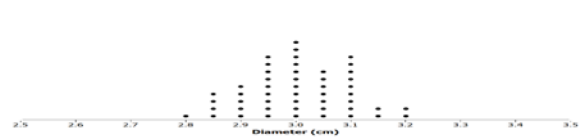
A machine that cut corks for wine bottles produces corks that have diameters with a mean of 3 cm and a standard deviation of 0.1 cm. Corks with diameters that are smaller than 2.9 cm or larger than 3.1 cm are considered defective (a cork that is too small will result in a leaky bottle and a cork that is too big will not fit in the bottle). Below is a histogram of the distribution of the diameters of the 1000 corks produced by this machine in one day.



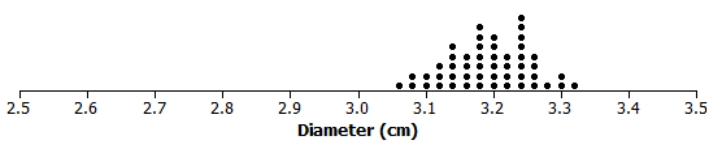
Dot Plot 1



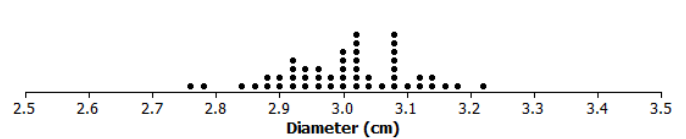
Dot Plot 2



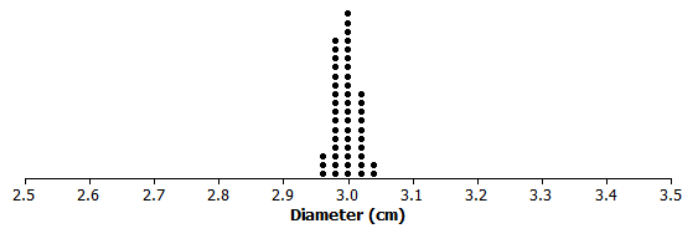
Dot Plot 3



Dot Plot 4



Dot Plot 5



Two of the dotplots are dotplots of the diameters of corks in random samples of size 50 from this population. Which two dotplots are these?

Two of the dotplots are dotplots of sample means from 50 random samples from this population. Which two dotplots are these?

Which of the two dotplots that you identified as a dotplot of sample means is based on the larger sample size?

Which dotplot is not a dotplot of a sample from this population and is also not a dotplot of sample means for random samples from this population? How can you tell?