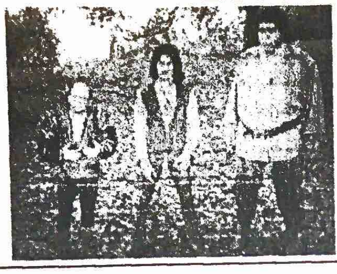
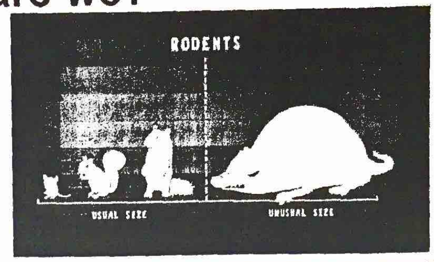
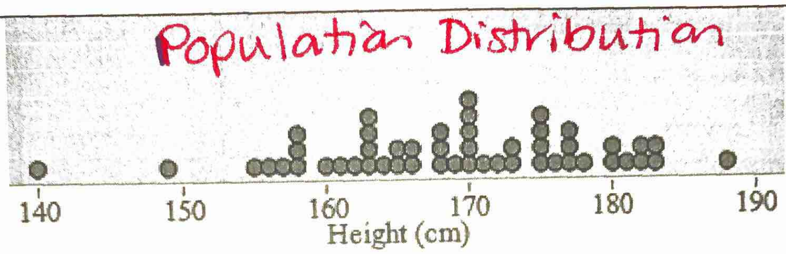
Name: ______________________________ Hour: _____ Date: ______

Lesson 7.3: Day 1: How tall are we?





How tall are high school seniors in Michigan? Attached are the heights of all 50 high school seniors at a small high school in the upper peninsula.



1. Make a guess at the mean of all 50 students. Make another guess of the standard deviation of all 50 students.

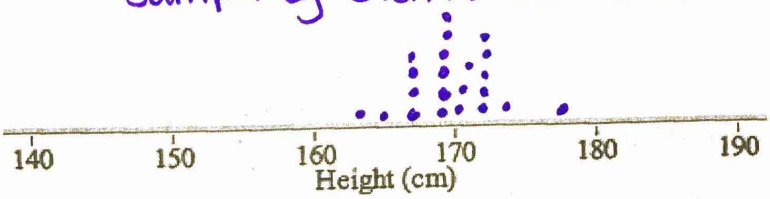
   $\mu = 168.96 \quad \sigma = 9.6$

2. Select a random sample of 5 students and calculate the mean height for the sample. Repeat for 4 samples total.

   Heights: ______________________ $\bar{x}$ = __________
   Heights: ______________________ $\bar{x}$ = __________
   Heights: ______________________ $\bar{x}$ = __________
   Heights: ______________________ $\bar{x}$ = __________

3. Add your sample means to the dotplot on the board. Sketch it below.

   Sampling distribution of $\bar{x}$



If the population is approx. Normal, the sampling distr. is approx Normal.

4. Describe the shape, center, and variability of this dotplot.

   Shape = roughly symmetric, single peak at 169.
   Center = approx. 169 cm.
   Variability = much smaller, maybe 3 ≈ σ.

   $\mu_{\bar{x}} = \mu$ $\quad \sigma_{\bar{x}} = \frac{\sigma}{\sqrt{n}}$

5. Compare the two dotplots above. How are the dotplots similar? How are they different?

   - Shapes of both are similar (roughly symmetric)
   - Centers are both at 169 cm.
   - The sampling distribution is much less variable.

TheStatsMedic

Name: ______________________________ Hour: _____ Date: _____

Lesson 7.3 Day 1 – Sample Means

Important ideas:

LT #1 Sampling Distribution of $\bar{x}$

$\mu_{\bar{x}} = \mu$

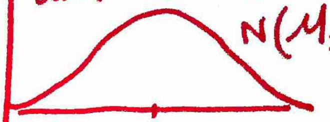
$\sigma_{\bar{x}} = \frac{\sigma}{\sqrt{n}}$

LT#2: Normal

If a population is approx. Normal, the sampling distribution of $\bar{x}$ will also be approx. Normal.

LT #3 z-score

Samp. Dist. of $\bar{x}$



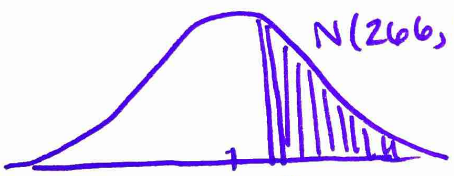
$z = \frac{\text{stat} - \text{para}}{\text{SD}}$

Check Your Understanding

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

1. Find the probability that a randomly chosen pregnant woman has a pregnancy that lasts for more than 270 days.

n=1



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

$z = \frac{270 - 266}{16}$

$= 0.25 \rightarrow \boxed{40.13\%}$

Suppose we choose an SRS of 6 pregnant women. Let $\bar{x}$ = the mean pregnancy length for the sample.

n=6

2. What is the mean of the sampling distribution of $\bar{x}$? $\mu_{\bar{x}} = \mu = 266$

3. Calculate and interpret the standard deviation of the sampling distribution of $\bar{x}$. Verify that the 10% condition is met.

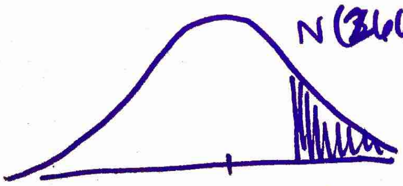
10%:

$6 < \frac{1}{10}$ all pregnant women ✓

$\sigma_{\bar{x}} = \frac{\sigma}{\sqrt{n}} = \frac{16}{\sqrt{6}} = 6.532$ days

If we take many samples of this size, we expect the sample mean typically varies by 6.532 days from the mean of 266 days

4. Find the probability that the mean pregnancy length for the women in the sample exceeds 270 days.



$z = \frac{270 - 266}{6.532}$

$= 0.612 \rightarrow \boxed{27.03\%}$