Module 7 Review

Int. Math 3 Honors

Name: **Key**

Period: _____

1. $A = \{11, 12.5, 13, 9, 12.5\}$ $B = \{1.2, 2.1, 1.8, 1.7, 1.9\}$

$$\sigma = \sqrt{\frac{\sum_{n=1}^{n}(x_n - \mu)^2}{n}}$$

a. Find the standard deviation of each set.

$$\sigma_A = 1.463 \qquad \sigma_B = 0.301$$

b. What is one standard deviation above A? Two below B?
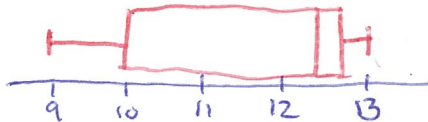
$$1\sigma_A + \mu_A = 11.6 + 1.463 = 12.463 \qquad \mu - 2\sigma_B = 1.47 - 2(.301) = 0.86$$

c. Create a modified box plot for **A**.

min = 9   med = 12.5   max = 13

9, 11, 12.5, 12.5, 13

$Q_1 = 10 \qquad Q_3 = 12.75$

d. Sketch a normal distribution curve for **B**.
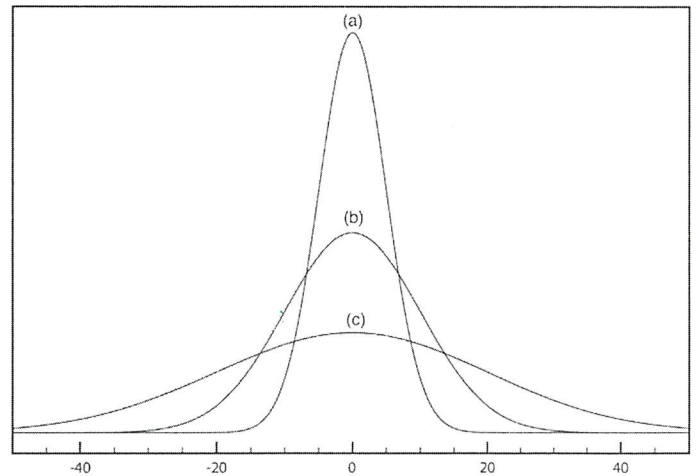Assuming **B** is normal

2. **Estimate the standard deviation for each**

(a)
(b)
(c)
-40   -20   0   20   40

3. **Does a larger standard deviation make the curve more wide or more narrow?**

$\sigma_A = 5 \quad \sigma_B = 10 \quad \sigma_C = 15$

4. **Explain the difference between a standard deviation of 1.2 versus a standard deviation of 34.**

the average distance data is from the mean is much lower when $\sigma = 1.2$ versus $\sigma = 34$

5. **The population of CCA students' heights is normally distributed with a mean of 5'5" and a standard deviation of 5.7 inches. Mr. Happ is considered unusually tall for his high school at 6' 5".**

⌐65"

⌐77"

a. What percent of CCA students are taller than Mr. Happ?

$$z = \frac{77-65}{5.7} = 2.11 \rightarrow 1 - .9826 = \boxed{1.74\%}$$

b. How tall would Mr. Happ have to be in order to be in the top 1% of CCA students' heights?

$$z = 2.33 \qquad 2.33 = \frac{x-65}{5.7} \qquad x = 78.3 \rightarrow \boxed{6'6"}$$

c. What percentage of students are between 5'1" and 6'4"?

$$z = \frac{61-65}{5.7} = -.70 \rightarrow 24.2\% \qquad z = \frac{76-65}{5.7} = 1.93 \rightarrow 97.3\%$$

subtract

$$= \boxed{73.12\%}$$

d. How tall does a student have to be in order to be above 87% of the population?

$$.87 \rightarrow z = 1.13 = \frac{x-65}{5.7}$$

$$\boxed{x = 71.4}$$

5'11.4"

6. Mr. Euler makes a mean monthly income of $10,500 with a standard deviation of $1,600. In one given month, Mr. Euler makes $8,500.

a. Find the z-score. $z = \dfrac{8500 - 10500}{1600} = -1.25$

b. Assuming Mr. Euler's monthly income follows a normal distribution, what percent of the time does he make more than this amount? Less than this amount?

more → 89.44%   less → 10.56%

c. What percent of the time does he make between $8,000 and $12,000?

$z = \dfrac{8000 - 10500}{1600} = -1.56$ $z = \dfrac{12000 - 10500}{1600} = .94$

.8264
− .0594
76.7%

d. What percent of the time does he make less than $8,500 or greater than $11,000?

$z = \dfrac{11000 - 10500}{1600} = .31 \rightarrow 37.83\%$ 10.56% → sum = 48.39%

e. If he needs to make $13,500, how likely in a given month is he to do this?

13500 or more $z = \dfrac{13500 - 10500}{1600} = 1.88 \rightarrow 96.99 \rightarrow 3.01\%$

7. Mr. Mueller wants to know the average height of the students in his school. There are 2089 students in his high school; he finds the heights of 27% of them.

Population: high school students   Sample: 27% of students   Parameter: height

8. Hector randomly selects 10 different tables in the lunchroom and surveys every student at the table to determine if students at the school are satisfied with school lunch.

Type of sample: cluster-   Representative? NO   Explain: Picks 10 entire table thus is a cluster
What about students who eat lunch else where!

9. Hector surveys the first 75 students in the lunch line to determine if students at the school are satisfied with school lunch.

Type of sample: Convenience   Representative? No   Explain: Some students stay after class a bit before going to lunch

10. Hector selects every 9th student in the lunch line to determine if students at the school are satisfied with school lunch.

Type of sample: systematic   Representative? NO   Explain: what about students who eat in the rest or off campus.

11. Create scenarios for the other three types of samples.

Type of sample: Stratified   Representative?   Explain:

Type of sample: Simple   Representative?   Explain:

Type of sample: volunteer   Representative?   Explain:

12. Identify each situation as a survey, observational study, or an experiment.

a. Stark Industries wants to know what their customer satisfaction is. They randomly select 123 customers and ask them.   *survey*

b. To determine if the new Nike Frees make you run faster, the Nike team randomly assign people into two groups: Group 1 receives Nike Frees and group 2 receives a placebo (look-alike shoe). Both groups are timed and the results are compared.   *experiment*

c. To determine whether exercise raises test scores, researchers randomly selected a group of participants and recorded the number of hours each participant exercised and the rise or fall of their test scores.

observational study

13. Provide an example for each of the following:
   a. Simple random sample

   Using a random number generator

   b. Cluster random sample

   Picking 10 states to survey.

   c. Systematic random sample

   Picking every 5th person

   d. Stratified random sample

   Picking 100 people from every state to survey.

14. Solve the following:

a. $3\cot^2 x - 1 = 0$

$\cot^2 x = \frac{1}{3}$ $\tan x = \pm\sqrt{3}$

$\tan^2 x = 3$ $x = \frac{\pi}{3} + 2\pi n, \; \frac{2\pi}{3} + 2\pi n, \; \frac{4\pi}{3} + 2\pi n, \; \frac{5\pi}{3} + 2\pi n$

b. $2\sin^2 3x + 5\sin 3x = 3$

$2\sin^2 3x + 5\sin 3x - 3 = 0$ $\sin 3x = \frac{1}{2}$ ~~$\sin 3x = -3$~~

$(2\sin 3x - 1)(\sin 3x + 3) = 0$ $3x = \frac{\pi}{6}, \; \frac{5\pi}{6}$

$\boxed{x = \frac{\pi}{18} + \frac{2\pi}{3}n, \; \frac{5\pi}{18} + \frac{2\pi}{3}n}$

c. $2\tan^2 \frac{x}{4} - \tan \frac{x}{4} - 6 = 0,$

$\left(2\tan \frac{x}{4} + 3\right)\left(\tan \frac{x}{4} - 2\right) = 0$

$\tan \frac{x}{4} = -\frac{3}{2}$ $\tan \frac{x}{4} = 2 \longrightarrow$ must use calculator

$\frac{x}{4} = -.983 + \pi n = \boxed{-3.932 + 4\pi n}$

$\frac{x}{4} = 1.11 + \pi n = \boxed{4.44 + 4\pi n}$

d. $\sec x \sin x - 3\sin x = 0$

$\sin x (\sec x - 3) = 0$

$\sin x = 0$ $\sec x = 3 \longrightarrow$ must use calculator

$\boxed{x = 0 + 2\pi n, \; \pi + 2\pi n}$ $\cos x = \frac{1}{3}$ $\boxed{x = 1.23 + 2\pi n \quad x = -1.23 + 2\pi n}$