Bell Work Chapter 2.5
Intro to Measures of Dispersion

Find the ***3 measures of central tendency*** for the following 2 sets of data. Then determine which is the ***better brand*** of paint if the data is representing the number months the paint will last?

Brand A: 10, 60, 50, 30, 40, 20

Brand B: 35, 45, 30, 35, 40, 25

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Make a dot plot of the data and see if that helps you determine which is better.

Brand A: 10, 60, 50, 30, 40, 20

Brand B: 35, 45, 30, 35, 40, 25

10 20 30 40 50 60

10 20 30 40 50 60

Now, which one do you think is better?

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Ch 2.5 ***<u>Measures of Dispersion</u>*** - look at the spread (distribution or variation) of the data

<u>Range</u> - how far the scores are spread apart.
highest - lowest scores

<u>Standard deviation</u> - how far the scores vary from the mean. (average of all the distances from the mean) sample $s = \sqrt{\frac{n\Sigma(x^2) - (\Sigma x)^2}{n(n-1)}}$

or $s = \sqrt{\frac{\Sigma(x-\bar{x})^2}{n-1}}$

Values that are closer together have smaller deviations compared to values that are further apart.

<u>Variance</u> - is the standard deviation squared s^2. Figure the variance first then standard deviation.

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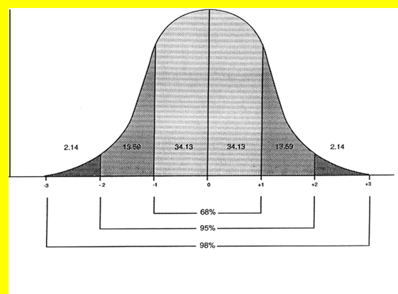
Normal Distribution



Ex1) mean = 80 and s = 2

+/- 1 s.d = 78 - 82
+/- 2 s.d. = 76 - 84
+/- 3 s.d. = 74 - 86

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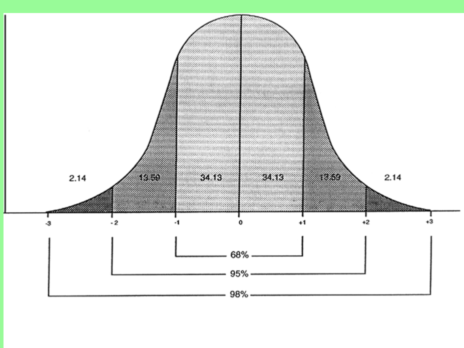

Try 1.)How would the data look if the mean was 75 and s = 5

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Ex2a) Find the range and the measures of dispersion for the two sets of data.

Brand A: 10, 60, 50, 30, 40, 20

Brand B: 35, 45, 30, 35, 40, 25

Now what can we say about comparing the two sets of brands?

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Ex2b) The measures of central tendency were all the same, so will the measures of dispersion tell us which bank is quicker?

Jefferson Valley Bank (single waiting line)	6.5	6.6	6.7	6.8	7.1	7.3	7.4	7.7	7.7	7.7
Bank of Providence (multiple waiting lines)	4.2	5.4	5.8	6.2	6.7	7.7	7.7	8.5	9.3	10.0

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Ex3) Standard deviation for grouped data:

$$s = \sqrt{\frac{n[\Sigma(x^2 \cdot f)] - [\Sigma(f \cdot x)]^2}{n(n-1)}}$$

x = midpoint in each class
f = frequency for each class
n = total number of scores in the set of data

Variance = s^2 compute 1st

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Ex3a) Find s and s^2.

classes	frequency	midpoint	$f \cdot x$	$f \cdot x^2$
70 - 89	36			
90 - 109	48			
110 - 129	84			
130 - 149	39			
150 - 169	33			
170 - 189	18			

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Ex3b) Find s and s^2.

classes	frequency
0-2	20
3-5	14
6-8	15
9-11	2
12-14	1

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Range Rule of Thumb - for many sets of data 95% of the sample values fall with in 2 standard deviations from the mean.

$s = \frac{\text{range}}{4}$ minimal value: $\bar{x} - 2s$
max value: $\bar{x} + 2s$

Ex4a) If the range is 1.2, what would be s using the range rule of thumb?

Ex4b) If s = 2.4 and $\bar{x}$ = 10.5 what would be your min and max values?

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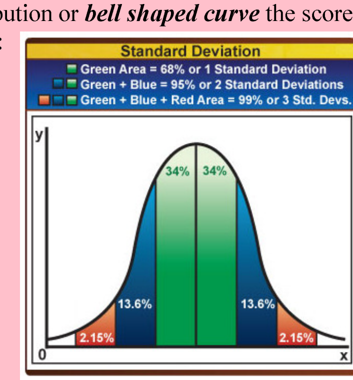
Empirical Rule - if the data has a ***normal*** distribution or ***bell shaped curve*** the scores fall under:



99.7%

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Ex5) If men's height has a normal distribution with a mean = 69.0 and s = 2.8in, what percent of men have heights between 60.6 and 77.4

Pull

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Ex5) Chebyshev's Theorem - applies to any data set.

k = # standard deviations

$\% = 1 - \frac{1}{k^2}$

2 s.d = 75%
3 s.d.= 89%

Ex5a) 75% of men's height would fall where?

Ex5b) 89% of men's height would fall where?

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