Sample Midterm 1

Problem 1. Heights of high school students have a bell-shaped distribution with a mean of 168 cm and a standard deviation of 6 cm. Using the empirical rule, what is the percentage of men between

(a) 156 cm and 180 cm

(b) 150 cm and 186 cm

How would your estimate would change if the distribution is not bell shaped?

Problem 2. Three students take equivalent stress tests. Which one is the highest relative score?

(a) A score of 144 on a test with a mean of 128 and a standard deviation of 34

(b)A score of 90 on a test with a mean of 86 and a standard deviation of 18

(c) A score of 18 on a test with a mean of 15 and a standard deviation of 5

Problem 3. Consider the following data:

11, 9, 2, 3, 34, 35, 23, 17, 15, 20, 21, 10, 18, 17, 13, 21, 18, 19

(a) Find the mean, median, mode, variance, standard deviation and range.

(b) Construct a frequency distribution table (including the relative frequency).

Problem 4. Consider the following frequency table:

Daily Low Temperature	Frequency
35 - 39	1
40 - 44	3
45 - 49	5
50 - 54	11
55 - 59	7
60 - 64	7
65 - 69	1

Estimate the mean and standard deviation of the data.

Problem 5. Consider the following table that shows the clinical test of the drug "Lipitor"

	10-mg Atorvastin	Placebo
Headache	15	65
No Headache	17	3

(a) If we randomly select one subject, what is the probability of getting a someone who had a headache?

(b)If we randomly select one subject, what is the probability of getting a someone who was treated with 10 mg of atorvastin?

(c)If we randomly select one subject, what is the probability of getting a someone who had a headache or was treated with 10 mg of atorvastin?

(d)f we randomly select one subject, what is the probability of getting a someone who had a headache, given that the subject was treated with 10 mg of atorvastin?

Cheat Sheet

◇ Mean:

$$\bar{X} = \frac{1}{n}\sum_{i=1}^{n} X_i \qquad (Sample), \qquad \mu = \frac{1}{N}\sum_{i=1}^{N} X_i \qquad (Population)$$

◇ Variance:

$$s^2 = \frac{1}{n-1}\sum_{i=1}^{n}(X_i - \bar{X})^2 \qquad (Sample), \qquad \sigma^2 = \frac{1}{N}\sum_{i=1}^{N}(X_i - \mu)^2 \qquad (Population)$$

For frequency distribution tables:

◇ Mean:

$$\bar{X} = \frac{1}{n}\sum_{i=1}^{n} f_i M_i$$

◇ Variance:

$$s^2 = \frac{1}{n-1}\sum_{i=1}^{n} f_i (M_i - \bar{X})^2 = \frac{n\sum_{i=1}^{n} f_i M_i^2 - \left(\sum_{i=1}^{n} f_i M_i\right)^2}{n(n-1)}$$

where M_i represents the midpoint of the i-th class.

◇ Chebyshev's Theorem:

$$Pr(|X - \mu| \le k\sigma) \ge 1 - \frac{1}{k^2}$$