

# Review problems for Midterm Stat 13

1. The numbers of bacteria from seven colonies are 5, 7, 3, 6, 12, 2, 7.
  - (a) Draw a dot plot.
  - (b) Find the sample mean.
  - (c) Find the sample median.
  - (d) Find the sample deviation.
  - (e) Find a number  $C$  which is as close to all data points as possible, if the criterion is to minimize the total of distance from  $C$  to each data point.
  - (f) Find the number  $C$  that minimizes the total of squared distance from  $C$  to each data point.
2. The surface area occupied by each colony was inspected by two experts. The results are given in the first two columns of the following table.

| Expert A | Expert B | A -mean | B-mean | product | squared | squared |
|----------|----------|---------|--------|---------|---------|---------|
| 1.8      | 1.9      | 0       | 0.1    |         |         |         |
| 1.9      | 1.8      | 0.1     | 0      |         |         |         |
| 1.6      | 1.6      |         |        |         |         |         |
| 1.9      | 1.8      | 0.1     |        |         |         |         |
| 2.4      | 2.3      | 0.6     | 0.5    |         | 0.36    | 0.25    |
| 1.3      | 1.5      | -0.5    | -0.3   |         | 0.25    | 0.09    |
| 1.7      | 1.7      |         |        |         |         |         |

- (a) Compute the correlation.
  - (b) Draw the scatterplot and put the vertical and horizontal lines through the means. Explain why the correlation is a positive
3. The density of salt in purified water varies from bottle to bottle with mean of 1 mg per c.c. and standard deviation of 0.05 mg per c.c.. Suppose a battery needs 10 c.c. of water. Option A is to get all 10 c.c. from one bottle. Option B is to get 5 c.c. from one bottle, and another 5 c.c. from a second bottle. Suppose the battery life will be shortened if more than 11.0 mg is present. Which option is safer? Evaluate the probability that the battery life will be shortened for each option.
4. The measurement error of a scale follows a normal distribution with mean 0 and standard deviation  $S$  ounces. An object is weighted 4 times by each of the 100 students in a class. Each student reported the average weight to the instructor.
  - (a). Suppose the true weight of the object is 5 ounces and the true  $S$  is .2 ounces. About how many answers will be between 4.9 and 5.1 ounces?
  - (b). Suppose the true weight of the object is unknown. The true  $S$  is .2 ounces. However, the mean of the answers from the class is 5.1 ounces. Find a 98 percent confidence interval of the true weight.

( c ). Suppose the true  $S$  is unknown. The standard deviation of answers from the class is found to be equal to 0.15 ounces. Estimate  $S$  .

More problems to come ...