

**Math 263, Section 4**  
**First Test Spring 2005**

**Name** \_\_\_\_\_  
**Pin (4 figure number)** \_\_\_\_\_

1. (6 points) You are constructing a histogram of the distribution of salaries of people in the US who are 40 years or older, but not yet retired.
  - (a) What quantity should be on the vertical axis? What are its units?
  - (b) What quantity should be on the horizontal axis? What are its units?
  - (c) Sketch the approximate shape of the histogram.
  
2. (12 points) Many studies have shown that high school students who study a foreign language tend to score higher on the verbal portion of the SAT college admission test than high school students who do not study a foreign language.
  - (a) Are such studies observational studies \_\_\_\_\_ or experiments \_\_\_\_\_? (Check one.)
  - (b) What is the explanatory variable in these studies?
  - (c) Is the explanatory variable categorical\_\_\_\_ or quantitative\_\_\_\_? (Check one)
  - (d) What is the response variable in these studies?
  - (e) Is the response variable categorical\_\_\_\_ or quantitative\_\_\_\_? (Check one)
  - (f) Can one conclude from these studies that studying a foreign language causes students' verbal SAT score to improve? Explain.

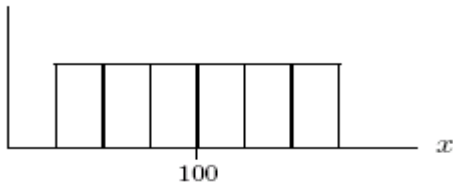
3. (5 points) A data set  $\{x_1, x_2, x_3\}$  has a mean of 17.

(a) Using sigma notation, write an equation relating  $x_1, x_2, x_3$ . (Your answer should contain  $x_1, x_2, x_3$  but no other letters.)

(b) Write the formula you would use to calculate the standard deviation of  $x_1, x_2, x_3$ . (Your answer should contain  $x_1, x_2, x_3$  but no other letters. You do not have to use sigma notation, but you may.)

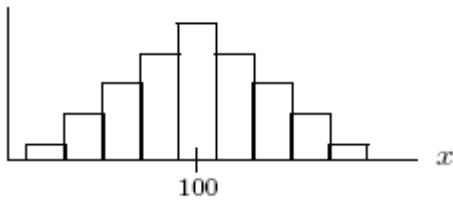
4. (5 points) Match the histograms (I)-(V) with one of the following standard deviations: 10, 20, 30, 40, 50.

(I)



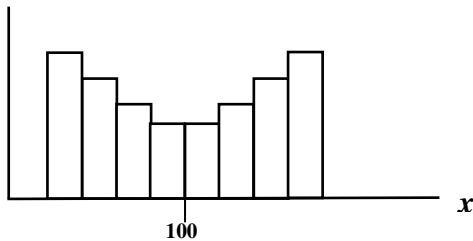
has standard deviation \_\_\_\_\_

(II)



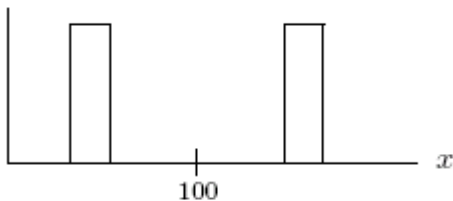
has standard deviation \_\_\_\_\_

(III)



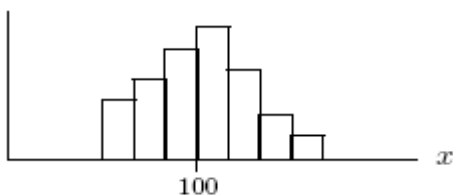
has standard deviation \_\_\_\_\_

(IV)



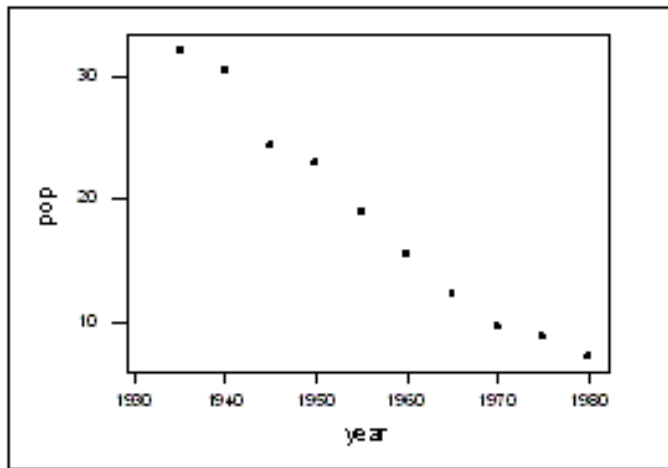
has standard deviation \_\_\_\_\_

(V)



has standard deviation \_\_\_\_\_

5. (20 points) The number of people living on American farms declined steadily during the last century. The plot shows data on the farm population (millions of persons) from 1935 to 1980. (Note: This question is *not* cumulative, so you can answer later parts without having answered earlier parts.)



- (a) Write a formula for the fraction of the variability in farm population that is *not* explained by the year.
- (b) Make a reasonable guess for the value of the correlation coefficient,  $r$ .

Use the regression output below to answer the questions (c) – (h).

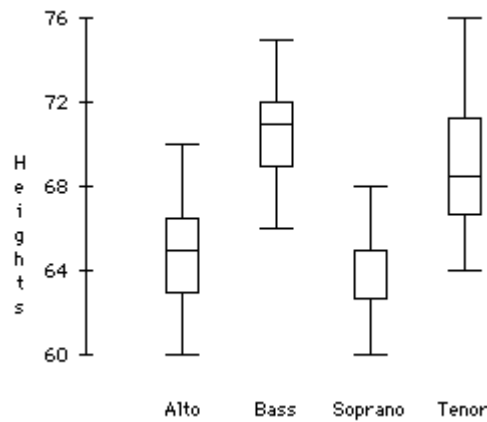
The regression equation is population = 1167 - .587 year				
Predictor	Coef	StDev	T	P
Constant	1166.93	62.26	18.74	0.000
year	-0.58679	0.03180	-18.45	0.000

- (c) What are the units of the 1167 in the context of farms?
- (d) What does the 1167 represent in the context of farms?
- (e) What are the units of the 0.587 in the context of farms?
- (f) What does the 0.587 represent in the context of farms?
- (g) Use the regression equation to estimate the number of people living on farms in the US in 2004. Explain your answer.

Problem 5 continued:

(h) If  $x$  is the year and  $y$  is the population in millions, could the point  $(\bar{x}, \bar{y})$  be (1957.5, 21.5)? Explain your answer.

6. (12 points) There are four voice parts in classical music: alto, bass, soprano, and tenor. The diagram below shows the distribution of heights, in inches, of the singers in the NY Choral Society in 1979, arranged by voice part. (Note: You do **not** need to know anything about music to do this problem!)



- (a) Two of the four voice parts, alto\_\_\_\_, bass\_\_\_\_, soprano\_\_\_\_, tenor\_\_\_\_, are sung by women. Which two? (Check two.)
- (b) Estimate the height of the tallest alto.
- (c) Which of the four groups has the largest IQR? Estimate the value of this IQR.
- (d) Which of the four groups has  $Q2 = Q3$ ? Estimate the value of  $Q2$  in this case.
- (e) Is the height of the shortest tenor greater\_\_\_\_ or smaller\_\_\_\_ than the median height of the altos? (Check one.)
- (f) Would a tenor of 82 inches be considered an outlier? Explain.