AP Statistics   Name: Key   8-30-2009

**Directions:** *Work on these sheets. Answer completely, but be concise.*

Part 1: Multiple Choice.   *Circle the letter corresponding to the best answer.*

1. A professor records the values of several variables for each student in her class. These include the
    variables listed below. Which of these variables are <u>categorical</u>?

b

(a) Score on the final exam (out of 100 points)
(b) Final grade for the course (A, B, C, D, or F) ← *not numeric*
(c) The total number of points earned in the class (i.e., the total of the points on all exams and
    quizzes in the course, out of 500 points)
(d) The number of classes the student missed
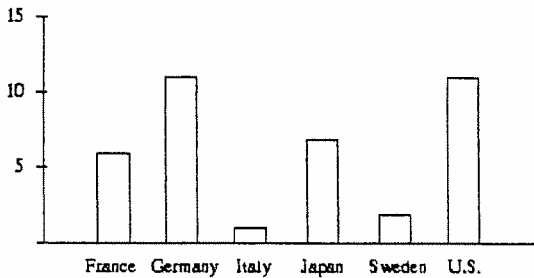(e) None of the above

Use the following to answer question 2:
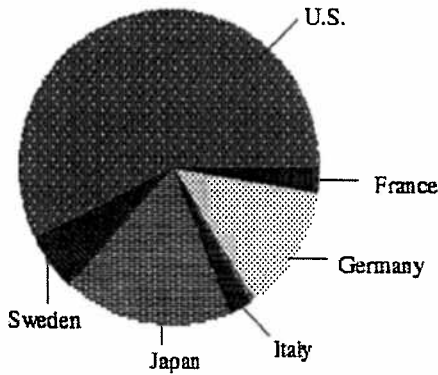
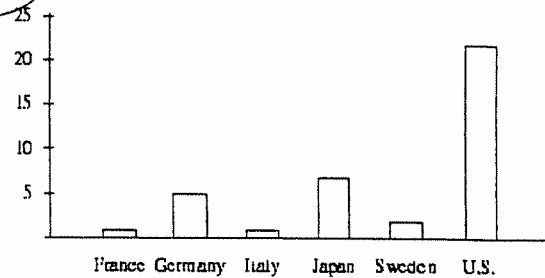2. Which of the following bar graphs is equivalent to the pie chart?

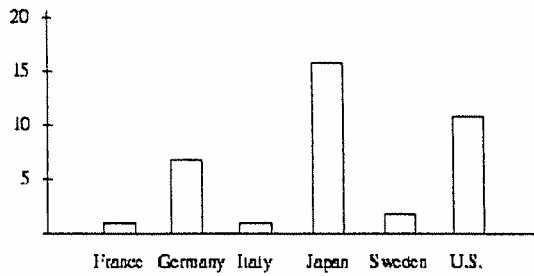b

(a)   (b)
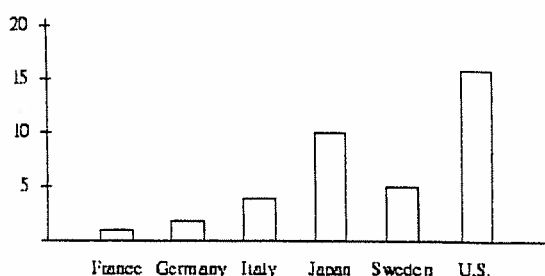

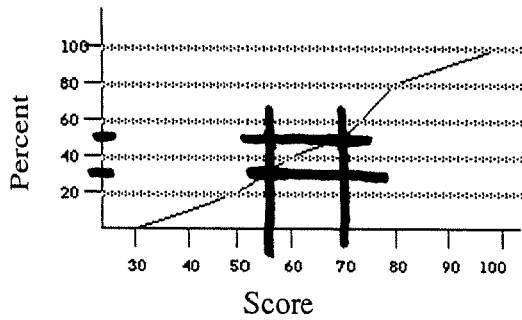(c)   (d)

(e) None of these.

3. Consider the following ogive of the scores of students in an introductory statistics course:

C
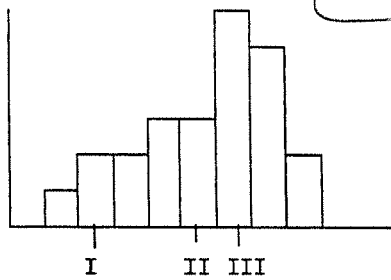
A grade of C or C+ is assigned to a student who scores between 55 and 70. The percentage of students that obtained a grade of C or C+ is:

(a) 25%
(b) 30%
(c) 20%
(d) 50%
(e) 15%

$50 - 30 = 20$

4. For the following histogram, what is the proper ordering of the mean, median, and mode? Note that the graph is NOT numerically precise—only the relative positions are important.

don't really know mode !!

mode = III ?

median = III
mean = II

d

(a) I = mean, II = median, III = mode
(b) I = mode, II = median, III = mean
(c) I = median, II = mean, III = mode
(d) I = mode, II = mean, III = median
(e) I = mean, II = mode, III = median

5. A researcher wishes to calculate the average height of patients suffering from a particular disease. From patient records, the mean was computed as 156 cm, and standard deviation as 5 cm. Further investigation reveals that the scale was misaligned, and that all readings are 2 cm too large, for example, a patient whose height is really 180 cm was measured as 182 cm. Furthermore, the researcher would like to work with statistics based on meters. The correct mean and standard deviation are:

(a) 1.56m, .05m
(b) 1.54m, .05m
(c) 1.56m, .03m
(d) 1.58m, .05m
(e) 1.58m, .07m

b

$\mu = 156 \rightarrow \mu = 154 \rightarrow 1.54$

$\sigma = 5 \rightarrow \sigma = 5$

$\boxed{a}$

$\times \frac{1}{100}$

6. A medical researcher collects health data on many women in each of several countries. One of the variables measured for each woman in the study is her weight in pounds. The following list gives the five-number summary for the weights of women in one of the countries.

Country A: 100, 110, 120, 160, 200

About what percentage of Country A women weigh between 110 and 200 pounds?
(a) 50%
(b) 65%
(c) 75%
(d) 85%
(e) 95%

C (handwritten left margin)

7. The median age of five people in a meeting is 30 years. One of the people, whose age is 50 years, leaves the room. The median age of the remaining four people in the room is:

(a) 40 years.
(b) 30 years.   *med = 30* (handwritten)
(c) 25 years.   *Depends on other data !* (handwritten)
(d) less than 30 years.
(e) Cannot be determined from the information given.

e (handwritten left margin)   *— — 30 — 5̶0̶* (handwritten)

8. The timeplot below gives the number of burglaries committed each month for a city in Ohio. The plot is for the three-year period January 1987-December 1989.
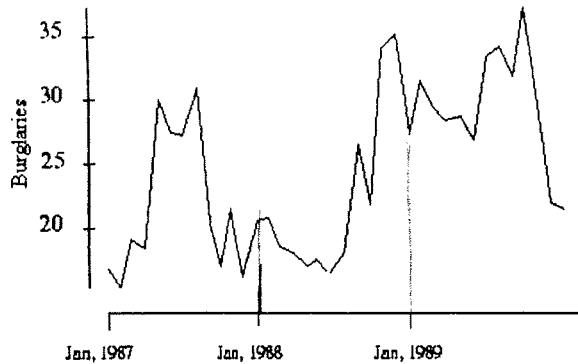
Which of the following is a true statement?
(a) The number of burglaries in each month of 1988 was lower than the number of burglaries in each month of 1989.
(b) The median number of burglaries for a month in 1988 was a little over 25.   *Can't really tell* (handwritten)
(c) The total number of burglaries in 1989 was higher than in 1988.
(d) More burglaries seem to be committed in June, July, and August during 1987, 1988, and 1989.
(e) None of the above.

C (handwritten left margin)

9. Here is a summary graph of complex carbohydrates for each of three fiber groups in a set of data related to cereals.
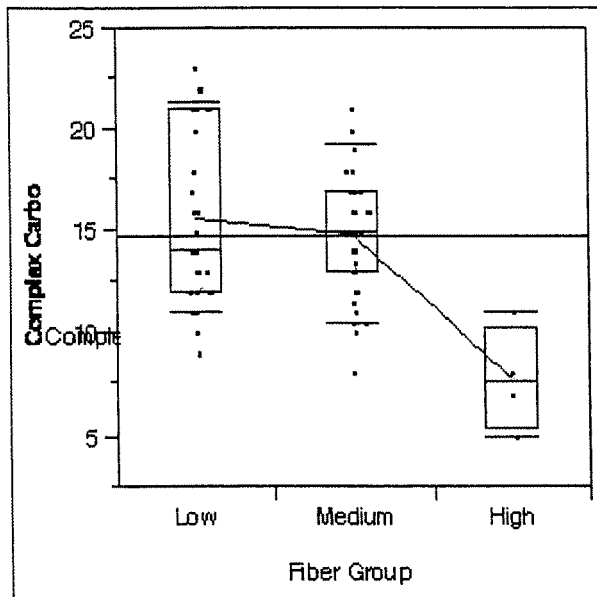
Which of the following is NOT correct?

(a) The low fiber group is more variable than the medium fiber group because the central box is larger.

(b) About 25% of low fiber cereals have less than 12 g of complex carbohydrates per serving.

(c) About 50% of medium fiber cereals have more than 15 g of complex carbohydrates per serving.

(d) The average amount of complex carbohydrates per serving for the high fiber group appears to be much smaller than the other two groups. _True, but wierd_

(e) About 25% of the medium fiber cereals have less than 10 g of complex carbohydrates. _13g is what it should be._

10. Earthquake intensities are measured using a device called a seismograph, which is designed to be most sensitive for earthquakes with intensities between 4.0 and 9.0 on the open-ended Richter scale. Measurements of nine earthquakes gave the following readings:

    4.5   L   5.5   H   8.7   8.9   6.0   H   5.2

where L indicates that the earthquake had an intensity below 4.0 and a H indicates that the earthquake had an intensity above 9.0. The median earthquake intensity of the sample is

(a) Cannot be computed since all of the values are not known

(b) 8.70

(c) 5.75

(d) 6.00

(e) 6.47

_L 4.5 5.2 5.5 (6.0) 8.7 8.9 H H_

11. We all "know" that the body temperature of a healthy person is 98.6 °F. In reality, the actual body temperature of individuals varies. Here is a back-to-back stemplot of the body temperatures of 130 healthy individuals (65 males and 65 females).

(a) Here are boxplots, produced by Minitab, for these distributions. Label both boxplots with the 5-number summary values.

Males		Females
③	96	
	96	④
7	96	7
9	96	8
1110	97	
32	97	22
544444	97	4
76⑥⑥	97	677
998888	97	888899⑨
①1000000	98	⑩00001
332222	98	222222333
554444	98	4④4445
77⑥⑥666	98	6666777777
9888	98	8⑧⑧8889
1000	99	0011
32	99	223
⑤4	99	4
	99	
	99	9
	100	0
	100	
	100	
	100	
	100	⑧

Boxplot (Males and Females), with handwritten labels: Males: 96.3, 97.6, 98.1, 98.6, 99.5. Females: 96.4, 97.8, 98.4, 98.8, 100.8.

(b) Determine whether the 3 points graphed by the + symbol are indeed outliers by our defined criteria.

$IQR = 98.8 - 97.95 = .85$

$1.5(.85) = 1.275$

$\begin{cases} 98.8 + 1.275 = 100.075 \\ 97.95 - 1.275 = 96.675 \end{cases}$ $\begin{cases} x > 100.075 \\ x < 96.675 \end{cases}$

96.4 and 100.8 ARE outliers

96.7 is NOT an outlier

(c) Write a few sentences comparing the body temperatures of adult males and females.

It would appear that overall, women have a higher body temperature than men. Each number in the 5-number summary of the female data is higher than that of the male data. The data for females is more spread out than the male data unless you ignore the 2 outliers. Then we see that both the IQR and range are about the same.

12. The following data represent scores of 50 students on a calculus test.

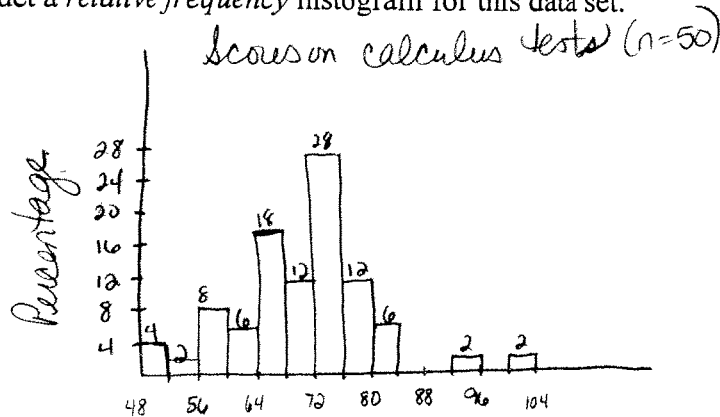|									
72	72	93	70	59	78	74	65	73	80
57	67	72	57	83	76	74	56	68	67
74	76	79	72	61	72	73	76	67	49
71	53	67	65	100	83	69	61	72	68
65	51	75	68	75	66	77	61	64	74

$n = 50$ $\bar{x} = 69.5$

$min = 49$ $\sigma = 9.$

$med = 71.5$
  65
  75

$max = 100$

(a) Construct a *relative frequency* histogram for this data set.

Scores on calculus tests $(n=50)$

Each bar includes the left point but not the right point.

(b) Are there any outliers? Justify your answer numerically.

$$IQR = 75 - 65 = 10$$

$$1.5(IQR) = 1.5(10) = 15$$

$65 - 15$ $75 + 15$ Outliers → 49, 93, 100

$x < 50$ $x > 90$
  outliers

(c) Describe the shape, center, and spread of the distribution of test scores.

The data is unimodal and fairly symmetric (perhaps slightly skewed to the left.) The center (median) is 71.5 with a mean of slightly less. The range is 51, IQR is 10, and st. deviation is about 9.5.

I pledge that I have neither given nor received aid on this test. _____