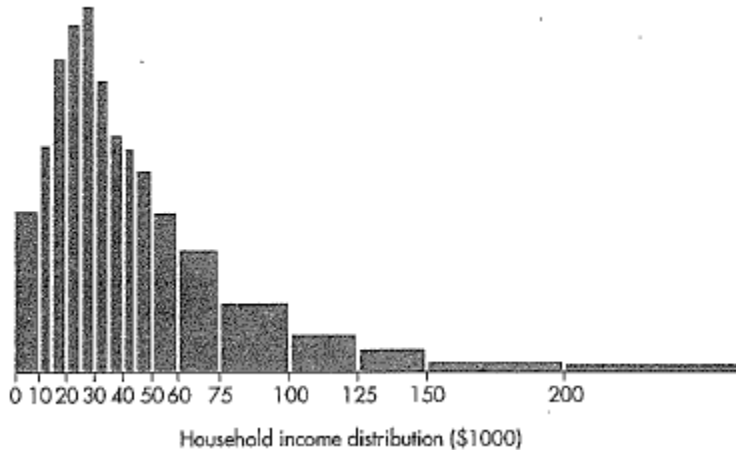


## HW # 17 Probability & Stats: Review for Final Exam

1. Use the histogram to answer

The graph below shows household income in Laguna Woods, California.



What can be said about the ratio  $\frac{\text{Median family income}}{\text{Mean family income}}$  ?

- a) Approximately zero
- b) Less than one, but definitely greater than zero
- c) Approximately one
- d) Greater than one
- e) Cannot be determined without knowing the standard deviation

2. Which of the following is a qualitative variable?

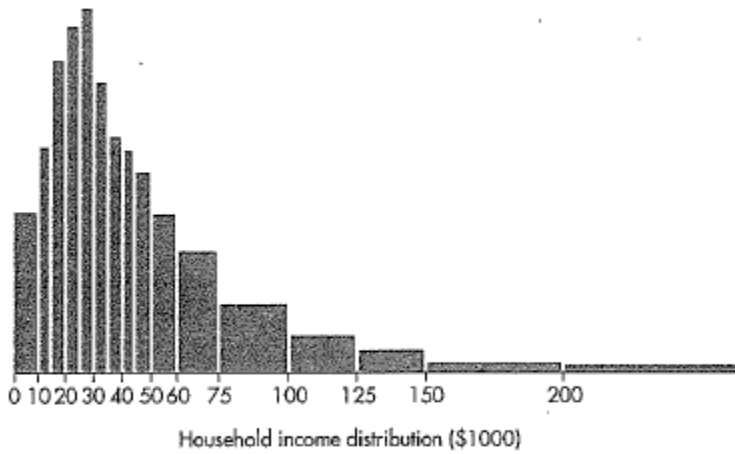
- I. The mean income of teachers in Kentucky.
- II. The types of desserts available at a restaurant.
- III. The different ethnicities of students at Manual.

- A. I only      B. II only      C. III only      D. I and III      E. II and III

3. The two major branches of statistics are:

4.

The graph below shows household income in Laguna Woods, California.



What can be said about the ratio  $\frac{\text{Mean family income}}{\text{Median family income}}$  ?

- a) Approximately zero
- b) Less than one, but definitely greater than zero
- c) Approximately one
- d) Greater than one**
- e) Cannot be determined without knowing the standard deviation

5. What is the symbol for each of the following:

- a) the sample mean \_\_\_\_\_
- b) population mean    $\mu$
- c) sample size   n
- d) sample standard deviation   s =  $s_x$
- e) population standard deviation    $\sigma$

6. What is selection bias in conducting surveys? Underrepresentation, missing some portion of your defined population

7. In the design of a survey, which of the following best describes response bias?

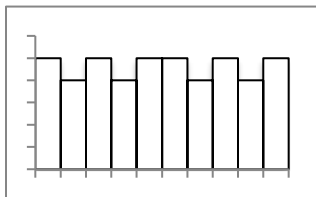
- a) Bias resulting from voluntary participation
- b) Bias resulting from leading questions**
- c) Bias resulting from people refusing to respond
- d) Bias resulting from carefully worded and field-tested questions
- e) None of these

8. Which graphical methods can be used with a categorical data set?

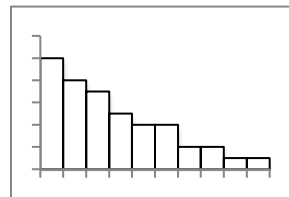
Bar charts, pie chart, segmented bar charts, iconograph

9. In which of the following histograms is the (i) mean greater than the median? And (ii) the median greater than the mean?

A.

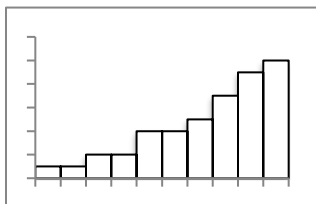


B.

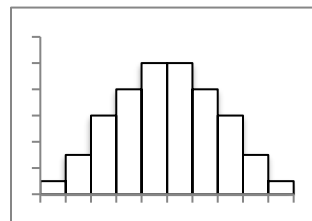


(i)

C.

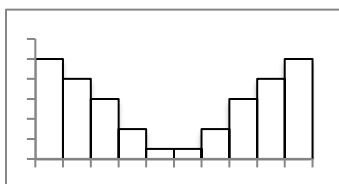


(ii)



D.

E.



10. What are the common measures of the center of a data set?

- 1) \_\_\_mean\_\_\_
- 2) \_\_\_median\_\_\_\_\_
- 3) \_\_\_mode\_\_\_\_\_

11. What is the distinction between a discrete versus a continuous numerical variable?

Discrete variables are “counted”, continuous variables are “measured”

12. Which of the following numerical variables are continuous?

- I. The number of jelly beans in a jar.
- II. The ages of a group of students.
- III. The humidity in Atlanta.
- IV. The number of ways to select a committee of three from a group of ten.
- V. The lengths of fish caught on a sport fishing trip.

- A. II only      B. III only      C. IV and V      D. III and V      E. II, III, and V

13. What is the calculation needed to determine if a data value is called an outlier?

$$\text{Low Outlier} = Q_1 - 1.5(IQR) \text{ or}$$
$$\text{High outlier} = Q_3 + 1.5(IQR)$$

14. A study of voting **chose 663 registered voters at random** shortly after an election. Of these, **56%** said they had voted in the election. Election records show that **only 61% of registered voters voted** in the election. Which of the following states is true about this situation?

- A. 61% is a sample, 56% is a population
- B. 61% and 56% are both statistics
- C. 61% is a statistic and 56% is a parameter
- D. **61% is a parameter and 56% is a statistic**
- E. 61% and 56% are both parameters

15. What are the measures spread (or variability) in a data set?

Range (difference between maximum and minimum)

Interquartile range ( $Q_3 - Q_1$ , *range of middle 50% of data*)

Standard deviation

Variance (standard deviation squared)

16. What is a z-score and how do you calculate it?

**A z-score, or standardized score measures the direction (positive or negative), and the distance (in terms of number of standard deviations) from the mean of a distribution.**

$$z \text{ score} = \frac{\text{observ.} - \text{mean}}{S.D.}$$

17. What is the first step of the data analysis process? **Understand the problem**

18. What does standard deviation mean and how is it calculated?

A common measure of spread or variability. It gives the typical deviation from the mean for a given data set.

$$S_x = \sqrt{\sum \frac{(x_i - \bar{x})^2}{n-1}}$$

19. A sales representative wishes to survey her client base of 47 companies. She has 47 business cards, all of the identical size, from her contacts in the companies, and decides to drop them all in a small box, shake them up, and reach in to pick 5 cards for her sample. This procedure is an example of which type of sampling?

a) Cluster

b) Convenience

**c) Simple random**

d) Stratified

e) Systematic

20. A normal distribution of scores has a standard deviation of 25. Find the z-scores corresponding to each of the following values:

a) A score that is 20 points above the mean.  $z \text{ score} = \frac{20}{25} = 0.8$

b) A score that is 15 points below the mean.  $z \text{ score} = \frac{-15}{25} = -0.6$

c) A score that is 23 points above the mean  $z \text{ score} = \frac{23}{25} = 0.92$

d) A score that is 20 points below the mean.  $z \text{ score} = \frac{-20}{25} = -0.8$

21. For the given data, determine the percentile rank for each specific observation:

59	62	63	66	69	70	71	74	74	79	81	84	88	89	91	92	92	94	95	98
----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----

a) The score of 74

74 is greater than or equal to  $\frac{9}{20} = 0.45$  45<sup>th</sup> percentile

b) The score of 88  $\frac{13}{20} = 0.65$  65<sup>th</sup> percentile

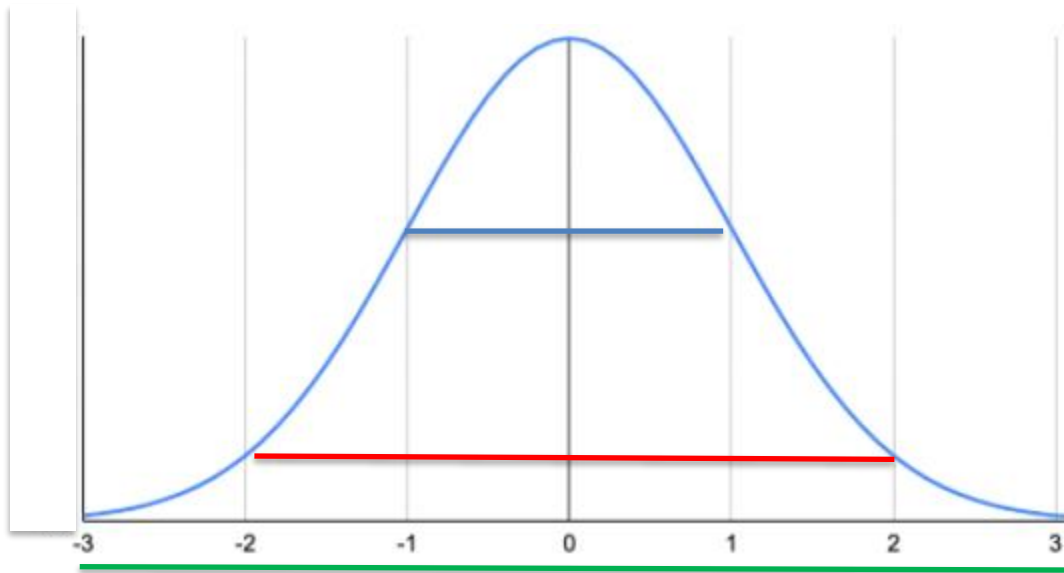
c) The score of 92  $\frac{17}{20} = 0.85$  85<sup>th</sup> percentile

22. Make a Stem-and-leaf plot for the data from #21.

5		9
6		2 3 6 9
7		0 1 4 4 9
8		1 4 8 9
9		1 2 2 4 5 8

Key: 6 | 2 = 62

23. What is the standard Normal distribution? What is the Empirical rule that relates to ALL Normal distributions?



68-95-99.7

17. In the standard  $(x,y)$  coordinate plane, what is the slope of the line given by the equation  $4x = 7y + 5$ ?

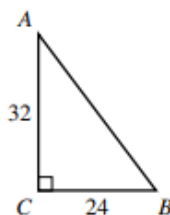
A.  $-\frac{4}{7}$   
B.  $\frac{4}{7}$   
C.  $\frac{7}{4}$   
D. 4  
E. 7

18. For which of the following conditions will the sum of integers  $m$  and  $n$  always be an odd integer?

F.  $m$  is an odd integer.  
G.  $n$  is an odd integer.  
H.  $m$  and  $n$  are both odd integers.  
J.  $m$  and  $n$  are both even integers.  
K.  $m$  is an odd integer and  $n$  is an even integer.

19. The lengths of the 2 legs of right triangle  $\triangle ABC$  shown below are given in inches. The midpoint of  $\overline{AB}$  is how many inches from  $A$ ?

A. 16  
B. 20  
C. 21  
D. 28  
E. 40



20. In  $\triangle DEF$ , the length of  $\overline{DE}$  is  $\sqrt{30}$  inches, and the length of  $\overline{EF}$  is 3 inches. If it can be determined, what is the length, in inches, of  $\overline{DF}$ ?

F. 3  
G.  $\sqrt{30}$   
H.  $\sqrt{33}$   
J.  $\sqrt{39}$   
K. Cannot be determined from the given information

21. Laura plans to paint the 8-foot-high rectangular walls of her room, and before she buys paint she needs to know the area of the wall surface to be painted. Two walls are 10 feet wide, and the other 2 walls are 15 feet wide. The combined area of the 1 window and the 1 door in her room is 60 square feet. What is the area, in square feet, of the wall surface Laura plans to paint?

A. 200  
B. 340  
C. 360  
D. 390  
E. 400

22. The length of a rectangle is 5 inches longer than the width. The perimeter of the rectangle is 40 inches. What is the width of the rectangle, in inches?

F. 7.5  
G. 8  
H. 15  
J. 16  
K. 17.5

23. 8% of 60 is  $\frac{1}{5}$  of what number?

A. 0.96  
B. 12  
C. 24  
D. 240  
E. 3,750

24. Armin is trying to decide whether to buy a season pass to his college basketball team's 20 home games this season. The cost of an individual ticket is \$14, and the cost of a season pass is \$175. The season pass will admit Armin to any home basketball game at no additional cost. What is the minimum number of home basketball games Armin must attend this season in order for the cost of a season pass to be less than the total cost of buying an individual ticket for each game he attends?

F. 8  
G. 9  
H. 12  
J. 13  
K. 20

25.  $\frac{4.8 \times 10^{-7}}{1.6 \times 10^{-11}} = ?$

A.  $3.0 \times 10^4$   
B.  $3.0 \times 10^{-4}$   
C.  $3.0 \times 10^{-18}$   
D.  $3.2 \times 10^{18}$   
E.  $3.2 \times 10^4$

26. A circle in the standard  $(x,y)$  coordinate plane has center  $C(-1,2)$  and passes through  $A(2,6)$ . Line segment  $\overline{AB}$  is a diameter of this circle. What are the coordinates of point  $B$ ?

F.  $(-6,-2)$   
G.  $(-5,-1)$   
H.  $(-4,-2)$   
J.  $(4, 2)$   
K.  $(5,10)$

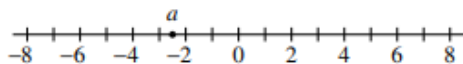
27. Which of the following expressions is a factor of  $x^3 - 64$ ?

A.  $x - 4$   
B.  $x + 4$   
C.  $x + 64$   
D.  $x^2 + 16$   
E.  $x^2 - 4x + 16$

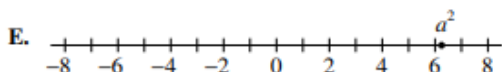
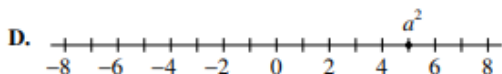
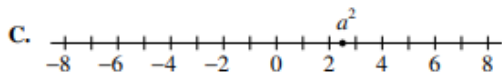
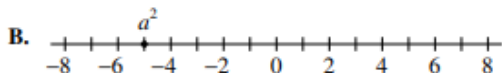
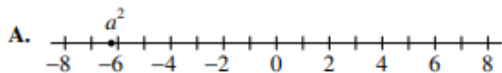


28. The average of a list of 4 numbers is 90.0. A new list of 4 numbers has the same first 3 numbers as the original list, but the fourth number in the original list is 80, and the fourth number in the new list is 96. What is the average of this new list of numbers?
- F. 90.0  
G. 91.5  
H. 94.0  
J. 94.5  
K. 94.8

29. The number  $a$  is located at  $-2.5$  on the number line below.



One of the following number lines shows the location of  $a^2$ . Which number line is it?



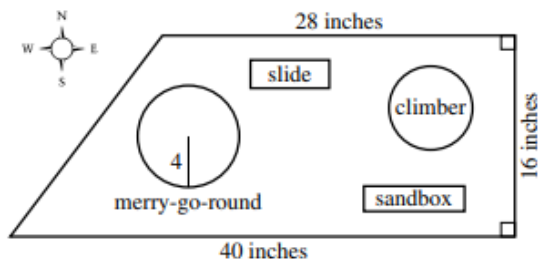
30. Maria ordered a pizza. She ate only  $\frac{2}{9}$  of it and gave the remaining pizza to her 3 brothers. What fraction of the whole pizza will each of Maria's brothers receive, if they share the remaining pizza equally?

- F.  $\frac{7}{9}$   
G.  $\frac{3}{7}$   
H.  $\frac{1}{3}$   
J.  $\frac{7}{27}$   
K.  $\frac{2}{27}$

31. The number 1,001 is the product of the prime numbers 7, 11, and 13. Knowing this, what is the prime factorization of 30,030?
- A.  $3 \cdot 7 \cdot 10 \cdot 13$   
B.  $30 \cdot 7 \cdot 11 \cdot 13$   
C.  $2 \cdot 5 \cdot 7 \cdot 11 \cdot 13$   
D.  $3 \cdot 7 \cdot 10 \cdot 11 \cdot 13$   
E.  $2 \cdot 3 \cdot 5 \cdot 7 \cdot 11 \cdot 13$

Use the following information to answer questions 32–34.

Mikea, an intern with the Parks and Recreation Department, is developing a proposal for the new trapezoidal Springdale Park. The figure below shows her scale drawing of the proposed park with 3 side lengths and the radius of the merry-go-round given in inches. In Mikea's scale drawing, 1 inch represents 1.5 feet.



32. What is the area, in square inches, of the scale drawing of the park?
- F. 448  
G. 544  
H. 640  
J. 672  
K. 1,088
33. Mikea's proposal includes installing a fence on the perimeter of the park. What is the perimeter, in *feet*, of the park?
- A. 84  
B. 88  
C. 104  
D. 126  
E. 156
34. The length of the south side of the park is what percent of the length of the north side?
- F. 112%  
G. 124%  
H.  $142\frac{6}{7}\%$   
J. 175%  
K. 250%