

1. School administrators collect data on students attending the school. Which of the following variables is quantitative?

- A. class (freshman, soph., junior, senior)
- B. grade point average
- C. whether the student is in AP classes
- D. whether the student has taken the SAT

2. Which of the following variables would most likely follow a Normal model?

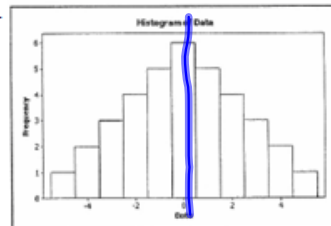
- A. family income
- B. heights of singers in a co-ed choir
- C. weights of adult male elephants
- D. scores on an easy test

⊕

3. A professor has kept records on grades that students have earned in his class. If he wants to examine the percentage of students earning grades A, B, C, D, and F during the most recent term, which kind of plot could he make?

- A. boxplot
- B. dotplot
- C. histogram
- D. pie chart %

4.



Which is true of the data shown in the histogram above?

- I. The distribution is approximately symmetric. ✓
- II. The mean and median are approximately equal. ✓ when skewed
- III. The median and IQR summarize the data better than the mean and standard deviation. ✗

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

5. Two sections of a class took the same quiz. Section A had 15 students who had a mean score of 80, and Section B had 20 students who had a mean score of 90. Overall, what was the approximate mean score for all the students on the quiz?

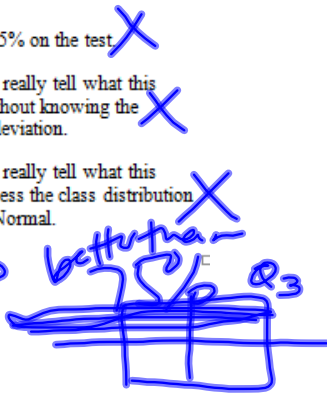
- A. 84.3
- B. 85.0
- C. 85.7
- D. none of these

$$\frac{15(80) + 20(90)}{35}$$

6. Your Stats teacher tells you your test score was in the 3rd quartile for the class. Which is true?

- I. You got 75% on the test. ~~X~~
- II. You can't really tell what this means without knowing the standard deviation. ~~X~~
- III. You can't really tell what this means unless the class distribution is nearly Normal. ~~X~~

- A. none of these
- B. I only
- C. II only
- D. III only



7. All but one of these statements contain a mistake. Which could be true?

- ~~X~~ A. The correlation between a football player's weight and the position he plays is 0.54.
- B. The correlation between the amount of fertilizer used and the yield of beans is 0.42.
- ~~X~~ C. There is a high correlation (1.09) between height of a corn stalk and its age in weeks.
- ~~X~~ D. There is a correlation of 0.63 between gender and political party.



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can't be > 1.

8. A company's sales increase by the same amount each year. This growth is -

- A. quadratic
- B. logarithmic
- C. exponential
- D. linear

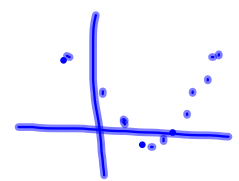
9. Residuals are -

- A. possible models not explored by the researcher. ~~X~~
- B. variation in the data that is explained by the model. ~~X~~
- C. the difference between observed responses and values predicted by the model. r^2 ✓
- D. data collected from individuals that is not consistent with the rest of the group. *outliers*



10. A scatter plot of $\frac{1}{\sqrt{y}}$ vs. x shows a strong positive linear pattern. It is probably true that -

- ~~X~~ A. the correlation between X and Y is near +1.0.
- ~~X~~ B. the scatterplot of Y vs. X also shows a linear pattern.
- ~~X~~ C. accurate predictions can be made for Y even if extrapolation is involved.
- D. the residuals plot for regression of Y on X shows a curved pattern.



11. Two variables that are actually not related to each other may nonetheless have a very high correlation because they both result from some other, possibly hidden, factor. This is an example of -

- A. leverage.
- B. a lurking variable.
- C. extrapolation.
- D. regression.

12. A company sponsoring a new Internet search engine wants to collect data on the ease of using it. Which is the best way to collect the data?

- A. census
- B. sample survey
- C. observational study
- D. experiment

13. The January 2005 Gallup Youth Survey telephoned a random sample of 1,028 U.S. teens and asked these teens to name their favorite movie from 2004. *Napoleon Dynamite* had the highest percentage with 8% of teens ranking it as their favorite movie. Which is true?

- ✓ I. The population of interest is all U.S. teens.
- ✓ II. 8% is a statistic and not the actual percentage of all U.S. teens who would rank the movie as their favorite. *blk came from a sample*
- ✓ III. This sampling design should provide a reasonably accurate estimate of the actual percentage of all U.S. teens who would rank this movie as their favorite. *yes bc random*

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

14. Suppose your local school district decides to randomly test high school students for attention deficit disorder (ADD). There are three high schools in the district, each with grades 9-12. The school board pools all of the students together and randomly samples 250 students. Is this a simple random sample?

- A. No, because we can't guarantee that there are students from each grade in the sample.
- B. Yes, because each student is equally likely to be chosen.
- C. Yes, because the students were chosen at random.
- D. Yes, because they could have chosen any 250 students from throughout the district.

15. More dogs are being diagnosed with thyroid problems than have been diagnosed in the past. A researcher identified 50 puppies without thyroid problems and kept records of their diets for several years to see if any developed thyroid problems. This is a(n) -

- A. randomized experiment
- B. retrospective study
- C. prospective study
- D. blocked experiment

16. A basketball player has a 70% free throw percentage. Which plan could be used to simulate the number of free throws she will make in her next five free throw attempts?

I. ~~Let 0, 1 represent making the first shot, 2, 3 represent making the second shot, ..., 8, 9 represent making the fifth shot. Generate five random numbers 0-9, ignoring repeats.~~

II. Let 0, 1, 2 represent missing a shot and 3, 4, ..., 9 represent making a shot. Generate five random numbers 0-9 and count how many numbers are in 3-9.

III. Let 0, 1, 2 represent missing a shot and 3, 4, ..., 9 making a shot. Generate five random numbers 0-9 and count how many numbers are in 3-9, ignoring repeats.

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

17. Five juniors and four seniors have applied for two open student council positions. School administrators have decided to pick the two new members randomly. What is the probability that they are both juniors or both seniors?

- A. 0.395
- B. 0.444
- C. 0.506
- D. 0.722



18. A fair coin has come up "heads" 10 times in a row. The probability that the coin will come up heads on the next flip is -

- A. less than 50%, since "tails" is due to come up.
- B. 50%
- C. greater than 50%, since it appears we are in a streak of "heads."
- D. It cannot be determined.

19. Which of these has a Binomial model?

- A. the number of people we survey until we find someone who has taken Statistics
- B. the number of aces in a five-card Poker hand
- C. the number of people in a class of 25 who have taken Statistics
- D. the number of sodas students drink per day

total # of successes in a certain # of trials.

20. BatCo, a company that sells batteries, claims that 99.5% of their batteries are in working order. How many would you expect to buy, on average, to find one that does not work?

- A. 5
- B. 100
- C. 200
- D. 995

$E(x) = \mu = \frac{1}{p}$
 $= \frac{1}{.005} = 200$

21. We have calculated a 95% confidence interval and would prefer for our next confidence interval to have a smaller margin of error without losing any confidence. In order to do this, we can -

- I. ~~change the z^* value to a smaller number~~
- II. take a larger sample.
- III. ~~take a smaller sample.~~

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

22. We have calculated a confidence interval based on a sample of size $n = 100$. Now we want to get a better estimate with a margin of error that is only one-fourth as large. How large does our new sample need to be?

$100 / \frac{1}{16}$

- A. 1,600
- B. 400
- C. 200
- D. 25

$\left(\frac{1}{4}\right)^2 = \frac{1}{16}$

23. The manager of an orchard expects about 70% of his apples to exceed the weight requirement for "Grade A" designation. At least how many apples must he sample to be 90% confident of estimating the true proportion within $\pm 4\%$?

$ME = z^* \cdot SD$

$ME = z^* \cdot \sqrt{\frac{pq}{n}}$

- A. 19
- B. 23
- C. 89
- D. 356

$.04 = 1.645 \cdot \sqrt{\frac{(.7)(.3)}{n}}$

$\left(\frac{.04}{1.645}\right)^2 = \frac{(.7)(.3)}{n}$

$\left(\frac{.04}{1.645}\right)^2 = \frac{(.7)(.3)}{n}$

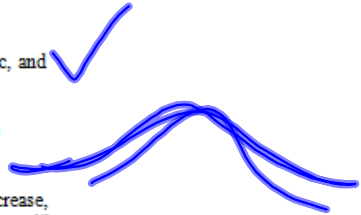
$n = 356$

24. A P-value indicates -

- A. the probability that the null hypothesis is true.
- B. the probability that the alternative hypothesis is true.
- C. the probability the null is true given the observed statistic.
- D. the probability of the observed statistic given that the null hypothesis is true.

25. Which of the following is true about Student's t -models?

- I. They are unimodal, symmetric, and bell-shaped. ✓
- II. They have fatter tails than the Normal model. ✓
- III. As the degrees of freedom increase, the t -models look more and more like the Normal. ✓



- A. I and II
- B. I and III
- C. II and III
- D. I, II, and III

26. How many degrees of freedom are there for a chi-square test of independence based on a table with five rows and six columns?

- A. 5
- B. 20
- C. 24
- D. 30

$(5-1)(6-1) = 20$

t^*
99%
d.f. = 14
 t^*

27. A professor was curious about her students' grade point averages (GPAs). She took a random sample of 15 students and found a mean GPA of 3.01 with a standard deviation of 0.534. Which of the following formulas gives a 99% confidence interval for the mean GPA of the professor's students?

- A. $3.01 \pm 2.977(0.534/\sqrt{15})$
- B. $3.01 \pm 2.977(0.534/\sqrt{14})$
- C. $3.01 \pm 2.917(0.534/\sqrt{14})$
- D. $3.01 \pm 2.977(0.534/\sqrt{15})$

28. A philosophy professor wants to find out whether the mean age of the men in his large lecture class is equal to the mean age of the women in his classes. After collecting data from a random sample of his students, the professor tested the hypothesis $H_0: \mu_M - \mu_W = 0$ against the alternative $H_A: \mu_M - \mu_W \neq 0$. The P -value for the test was 0.003. Which is true?

- A. There is a 0.3% chance that the mean ages for the men and women are equal.
- B. There is a 0.3% chance that the mean ages for the men and women are different.
- C. It is very unlikely that the professor would see results like these if the mean age of men was equal to the mean age of women.
- D. There is a 0.3% chance that another sample will give these same results.

29. The two samples whose statistics are given in the table below are thought to come from populations with equal variances.

n	Mean	SD
25	32	5
20	30	6

What is the pooled estimate of the population standard deviation?

- A. 1.64
- B. 3.32
- C. 5.46
- D. 5.59

$$\sqrt{\frac{5^2}{25} + \frac{6^2}{20}}$$

30. We randomly divide 200 volunteers with headaches into two groups who take identical-looking pills. One group gets a homeopathic remedy and the other a placebo. After 20 minutes, we ask them to rate their headache pain as "no change," "somewhat better," "much better," or "gone." What is the appropriate test?

- A. 2-proportion z -test
- B. matched pairs t -test
- C. 2 sample t -test
- D. χ^2 test of homogeneity