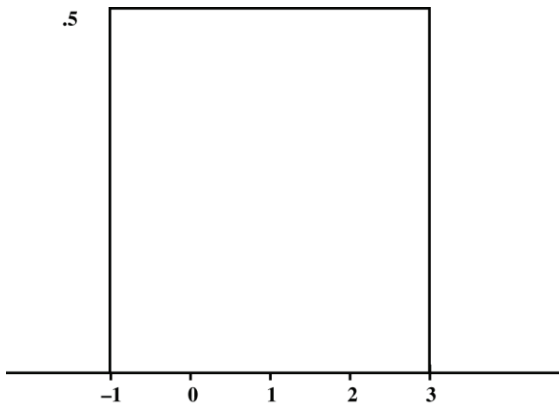


Practice Midterm 1

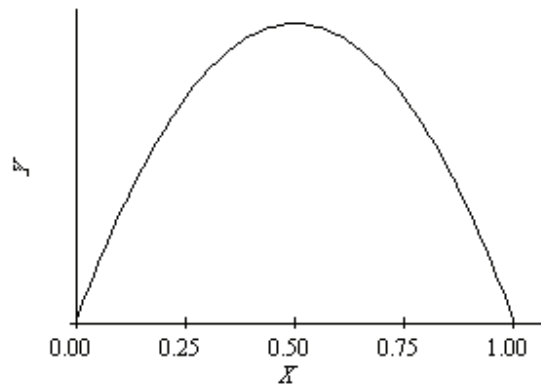
(Chapters 1-9)

1. As part of survey of college students a researcher is interested in the variable class standing. She records a 1 if the student is a freshman, a 2 if the student is a sophomore, a 3 if the student is a junior, and a 4 if the student is a senior. The variable class standing is
 - A) incremental.
 - B) numerical.
 - C) categorical.
 - D) quantitatively categorical.
 - E) all of the above.
2. A survey records many variables of interest to the researchers conducting the survey. Which of the following variables, from a survey conducted by the U.S. Postal Service, is categorical?
 - A) county of residence.
 - B) number of people, both adults and children, living in the household.
 - C) years lived at that address.
 - D) age of respondent.
 - E) total household income, before taxes, in 1993.
3. A particularly common question in the study of wildlife behavior involves observing contests between “residents” of a particular area and “intruders.” In each contest, the “residents” either win or lose the encounter (assuming there are no ties). Observers might record several variables. Which of the following variables is categorical?
 - A) the duration of the contest (in seconds).
 - B) How long the “intruder” lives in the area before it is accepted as a “resident.”
 - C) whether the “residents” win or lose.
 - D) the total number of contests won by the “residents.”
 - E) the number of animals involved in the contest.
4. A description of different houses on the market includes the following three variables. Which of these variables is quantitative?
 - A) the square footage of the house.
 - B) the monthly gas bill.
 - C) the monthly electric bill.
 - D) the assessed value for tax purposes.
 - E) all of the above.
5. A professor records the values of several variables for each student in her class. Which of the following variables is categorical?
 - A) the number of courses the student has taken from the department.
 - B) final grade for the course (A, B, C, D, or F).
 - 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—the maximum number of points possible is 500).
 - D) the number of lectures the student missed.
 - E) score on the final exam (out of 200 points).

Use the following to answer questions 6 through 8:



6. For this density curve, which of the following is true?
A) The curve is symmetric. D) All of the above.
B) The interquartile range is 1.
C) The median is 1.
7. For this density curve, what percentage of the observations lies above 1.5?
A) Less than 10%. B) 25%. C) 50%. D) 75%. E) 80%.
8. For this density curve, what percentage of the observations lies between 0.5 and 1.2?
A) 25%. B) 35%. C) 50%. D) 60%. E) 70%.
9. For the density curve displayed below, the mean is

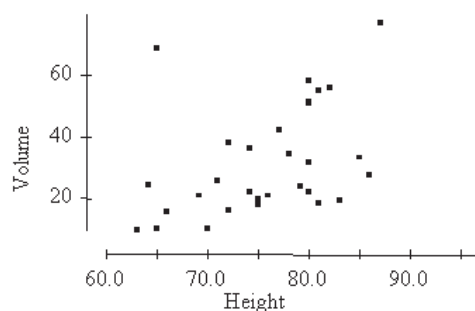


- A) 0.25. B) 0.50. C) 0.71. D) 0.75. E) 1.

10. A normal density curve has which of the following properties?
- A) It is symmetric.
 - B) The median is equal to the mean.
 - C) The spread of the curve is proportional to the standard deviation.
 - D) It has a peak centered above its mean.
 - E) All of the above.
11. A study is conducted to determine if one can predict the yield of a crop based on the amount of yearly rainfall. The response variable in this study is
- A) the yield of the crop.
 - B) the amount of yearly rainfall.
 - C) the experimenter.
 - D) either bushels or inches of water.
 - E) the month the crop is harvested.
12. A researcher is interested in determining if one can predict the score a student gets on a statistics exam from the amount of time the student spends studying for the exam. In this study, the explanatory variable is
- A) the researcher.
 - B) the students taking the exam.
 - C) the score on the exam.
 - D) the fact that this is a statistics exam.
 - E) the amount of time spent studying for the exam.
13. When creating a scatterplot, one should
- A) use only positive values of the explanatory variable.
 - B) use the horizontal axis for the explanatory variable.
 - C) use a different plotting symbol depending on whether the explanatory variable is categorical or the response variable is categorical.
 - D) use a plotting scale that makes the overall trend roughly linear.
 - E) use the horizontal axis for the response variable.

Use the following to answer questions 14 and 15:

A researcher measures the height (in feet) and volume of usable lumber (in cubic feet) of 32 cherry trees. The goal is to determine if the volume of a tree's usable lumber can be estimated from the height of the tree. The results are plotted below.



14. In the study above, the response variable is
- A) number of trees.
 - B) volume.
 - C) height or volume; it doesn't matter which is considered the response variable.
 - D) neither height nor volume; the measuring instrument used to measure height is the response variable.
 - E) height.
15. The scatterplot above suggests that
- A) there is a positive association between height and volume.
 - B) there is an outlier in the plot.
 - C) both A and B.
 - D) neither A nor B.
 - E) the relationship between height and volume is nonlinear.

Use the following to answer questions 16 through 17:

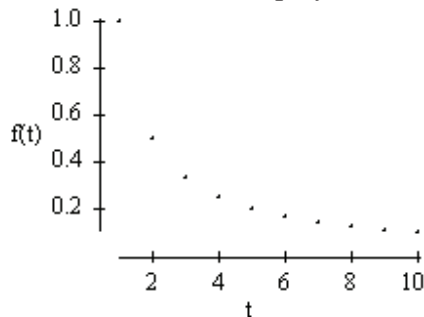
A business has two types of employees, managers and workers. Managers earn either \$100,000 or \$200,000 per year. Workers earn either \$10,000 or \$20,000 per year. The number of male and female managers at each salary level and the number of male and female workers at each salary level are given in the tables below.

	<u>Managers</u>			<u>Workers</u>	
	<u>Male</u>	<u>Female</u>		<u>Male</u>	<u>Female</u>
\$100,000	80	20	\$10,000	30	20
\$200,000	20	30	\$20,000	20	80

16. The proportion of male managers who make \$200,000 per year is
- A) 0.067.
 - B) 0.133.
 - C) 0.200.
 - D) 0.400.
 - E) 0.600.

17. The proportion of female managers who make \$200,000 per year is
 A) 0.100. B) 0.200. C) 0.300. D) 0.400. E) 0.600.

18. The transformation displayed in the scatterplot below is



- A) concave up. D) an example of linear growth.
 B) concave down. E) an example of exponential growth.
 C) an example of logarithmic growth.
19. Which of the following is true?
 A) $\log(AB) = \log A \times \log B$. D) $\log(A/B) = \log A - \log B$.
 B) $\log(A + B) = \log A + \log B$. E) All of the above.
 C) $\log A^B = \log A \times \log B$.
20. Suppose we measure a response variable Y at each of several times. A scatterplot of $\log Y$ versus time of measurement looks approximately like a positively sloping straight line. We may conclude that
 A) the correlation between time of measurement and Y is negative, since logarithms of positive fractions (such as correlations) are negative.
 B) the rate of growth of Y is positive, but slowing down over time.
 C) a logarithmic growth model would approximately describe the relationship between Y and the time of measurement.
 D) a mistake has been made. It would have been better to plot Y versus the logarithm of the time of measurement.
 E) an exponential growth model would approximately describe the relationship between Y and time of measurement.

21. In order to determine if smoking causes cancer, researchers surveyed a large sample of adults. For each adult they recorded whether the person had smoked regularly at any period in his or her life and whether the person had cancer. They then compared the proportion of cancer cases in those who had smoked regularly at some time with the proportion of cases in those who had never smoked regularly at any point. The researchers found there was a higher proportion of cancer cases among those who had smoked regularly than among those who had never smoked regularly. This is
- A) a matched pairs study.
 - B) an experiment, but not a double-blind experiment.
 - C) a double-blind experiment.
 - D) a block design.
 - E) an observational study.
22. In order to assess the effects of exercise on reducing cholesterol, a researcher sampled 50 people from a local gym who exercised regularly and 50 people from the surrounding community who did not exercise regularly. They each reported to a clinic to have their cholesterol measured. The subjects were unaware of the purpose of the study, and the technician measuring the cholesterol was not aware of whether subjects exercised regularly or not. This is
- A) an observational study.
 - B) an experiment, but not a double-blind experiment.
 - C) a controlled study.
 - D) a matched-pairs experiment.
 - E) a double-blind experiment.
23. In order to investigate whether women are more likely than men to prefer Democratic candidates, a political scientist selects a large sample of registered voters, both men and women. She asks every voter whether they voted for the Republican or the Democratic candidate in the last election. This is
- A) an observational study.
 - B) a multistage sample.
 - C) a double-blind experiment.
 - D) a block design.
 - E) a systematic survey.

24. Can pleasant aromas help a student learn better? Two researchers believed that the presence of a floral scent could improve a person's learning ability in certain situations. They had 22 people work through a pencil-and-paper maze six times, three times while wearing a floral-scented mask and three times wearing an unscented mask. The three trials for each mask closely followed one another. Testers measured the length of time it took subjects to complete each of the six trials. They reported that, on average, subjects wearing the floral-scented mask completed the maze more quickly than those wearing the unscented mask, although the difference was not statistically significant. This study is
- A) a convenience sample.
 - B) an observational study, not an experiment.
 - C) an experiment, but not a double-blind experiment.
 - D) a controlled study.
 - E) a double-blind experiment.
25. A market research company wishes to find out whether the population of students at a university prefers brand A or brand B of instant coffee. A random sample of students is selected, and each student is asked first to try brand A and then to try brand B, or vice versa (with the order determined at random). They then indicate which brand they prefer. This is an example of
- A) an experiment.
 - B) an observational study, not an experiment.
 - C) a stratified sampling design.
 - D) a block design.
 - E) a systematic sampling design.
26. I toss a penny and observe whether it lands heads up or tails up. Suppose the penny is fair; that is, the probability of heads is $\frac{1}{2}$ and the probability of tails is $\frac{1}{2}$. This means
- A) that every occurrence of a head must be balanced by a tail in one of the next two or three tosses.
 - B) that if I flip the coin many, many times, the proportion of heads will be approximately $\frac{1}{2}$, and this proportion will tend to get closer and closer to $\frac{1}{2}$ as the number of tosses increases.
 - C) that regardless of the number of flips, half will be heads and half tails.
 - D) generally, the flips will alternate between heads and tails.
 - E) all of the above.
27. A phenomenon is observed many, many times under identical conditions. The proportion of times a particular event A occurs is recorded. This proportion represents
- A) the probability of the event A.
 - B) the distribution of the event A.
 - C) the correlation of the event A.
 - D) the proportionality of the event A.
 - E) the variance of the event A.

28. A basketball player makes 160 out of 200 free throws. We would estimate the probability that the player makes his next free throw to be
 A) 0.16. B) 50-50; either he makes it or he doesn't. C) 0.80. D) 1.2. E) 80.
29. If the individual outcomes of a phenomenon are uncertain, but there is nonetheless a regular distribution of outcomes in a large number of repetitions, we say the phenomenon is
 A) random. B) predictable. C) deterministic. D) probabilistic.
 E) none of the above.
30. I toss a thumbtack 60 times and it lands point up on 35 of the tosses. The approximate probability of landing point up is
 A) 35. B) 0.35. C) 0.58. D) 0.65. E) 58.

Use the following to answer questions 31 and 32:

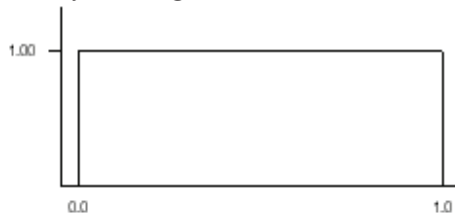
A psychologist studied the number of puzzles subjects were able to solve in a five-minute period while listening to soothing music. Let X be the number of puzzles completed successfully by a subject. The psychologist found that X had the following probability distribution:

Value of X	1	2	3	4
Probability	0.2	0.4	0.3	0.1

31. Referring to the information above, the probability that a randomly chosen subject completes *at least* three puzzles in the five-minute period while listening to soothing music is
 A) 0.3. B) 0.4. C) 0.6. D) 0.7. E) 0.9.
32. Referring to the information above, $P(X < 3)$ has value
 A) 0.3. B) 0.4. C) 0.6. D) 0.9. E) 2.

Use the following to answer questions 33 through 35:

Let the random variable X be a randomly generated number with the uniform probability density curve given below.



33. Referring to the information above, $P(X = 0.25)$ is
A) 0. B) 0.025. C) 0.25. D) 0.75. E) 1.
34. Referring to the information above, $P(X \leq 0)$ has value
A) 0. B) 0.1. C) 0.5. D) 1.
E) The value cannot be determined since X must be greater than 0.
35. Referring to the information above, $P(0.7 < X < 1.1)$ has value
A) 0.30. B) 0.40. C) 0.60. D) 0.70. E) 1.1.
36. An airplane has a front door and a rear door that are both opened to allow passengers to exit when the plane lands. The plane has 100 passengers seated. The number of passengers exiting through the front door should have
A) a binomial distribution with mean 50.
B) a binomial distribution with 100 trials but success probability not equal to 0.5.
C) a binomial distribution with 50 trials but success probability not equal to 0.5.
D) a normal distribution with a standard deviation of 5.
E) none of the above distributions.
37. A small class has 10 students. Five of the students are male and five are female. I write the name of each student on a 3-by-5 card. The cards are shuffled thoroughly and I choose one at random, observe the name of the student, and replace it in the set. The cards are thoroughly reshuffled and I again choose a card at random, observe the name, and replace it in the set. This is done a total of four times. Let X be the number of cards observed in these four trials with a name corresponding to a male student. The random variable X has which of the following probability distributions?
A) The normal distribution with mean 2 and variance 1.
B) The binomial distribution with parameters $n = 4$ and $p = 0.5$.
C) The binomial distribution with parameters $n = 4$ and $p = 0.1$.
D) The uniform distribution on 0, 1, 2, 3, and 4.
E) None of the above.

38. For which of the following counts would a binomial probability model be reasonable?
- A) The number of traffic tickets written by each police officer in a large city during one month.
 - B) The number of hearts in a hand of five cards dealt from a standard deck of 52 cards that has been thoroughly shuffled.
 - C) The number of 7's in a randomly selected set of five random digits from a table of random digits.
 - D) The number of phone calls received in a one-hour period.
 - E) All of the above.
39. A set of 10 cards consists of five red cards and five black cards. The cards are shuffled thoroughly and I choose one at random, observe its color, and replace it in the set. The cards are thoroughly reshuffled and I again choose a card at random, observe its color, and replace it in the set. This is done a total of four times. Let X be the number of red cards observed in these four trials. The mean of X is
- A) 4. B) 2. C) 1. D) 0.5. E) 0.1.
40. A set of 10 cards consists of five red cards and five black cards. The cards are shuffled thoroughly and I choose six of them at random. Let X be the number of red cards observed in the six chosen. The random variable X has which of the following probability distributions?
- A) The normal distribution with mean 3 and variance 1.22.
 - B) The binomial distribution with parameters $n = 6$ and $p = 0.5$.
 - C) A skewed right distribution.
 - D) The uniform distribution on 0, 1, 2, 3, 4, 5, and 6.
 - E) None of the above.
41. A phone-in poll conducted by a newspaper reported that 73% of those who called in liked business tycoon Donald Trump. The number 73% is a(n)
- A) unbiased estimate. B) sample. C) parameter. D) population. E) statistic.
42. A phone-in poll conducted by a newspaper reported that 73% of those who called in liked business tycoon Donald Trump. The unknown true percentage of American citizens who like Donald Trump is a
- A) statistic. B) variable. C) parameter. D) population. E) sample.
43. A survey conducted by Black Flag asked whether the action of a certain type of roach disk would be effective in killing roaches. Seventy-nine percent of the respondents agreed that the roach disk would be effective. The number 79% is a(n)
- A) unbiased estimate. B) population. C) statistic. D) sample. E) parameter.

44. A 1993 survey conducted by the local paper in Columbus, Ohio, one week before election day asked voters who they would vote for in the City Attorney's race. Thirty-seven percent said they would for the Democratic candidate. On election day, 41% actually did vote for the Democratic candidate. The number 41% is a
- A) variable.
 - B) statistic.
 - C) population.
 - D) sample.
 - E) parameter.
45. The sampling distribution of a statistic is
- A) the probability that we obtain the statistic in repeated random samples.
 - B) the mechanism that determines whether randomization was effective.
 - C) the distribution of values taken by a statistic in all possible samples of the same size from the same population.
 - D) the extent to which the sample results differ systematically from the truth.
 - E) the distribution of a particular sample of a certain size.