

- 1) A researcher wants to estimate the length of time it takes a resident of Massachusetts to earn a Bachelor's degree from a state college or university. A random sample of 265 recent in-state graduates were surveyed. Identify the variable.

A) All graduates in Massachusetts	B) Random sample of 265 graduates
C) All Massachusetts residents	D) Length of time to graduate

- 2) Refer to problem 1. Suppose the researcher calculated that the average time to graduate for the sample of 265 graduates was 4.8 years. The value of 4.8 years is a

A) Parameter	B) Sample	C) Statistic	D) Population
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- 3) A descriptive measure of a population is a

A) Statistic	B) Variable
C) Qualitative response	D) Parameter

- 4) Classify the following random variable according to whether it is qualitative, quantitative-discrete, or quantitative-continuous: The height of a player on a basketball team.
 - A) Qualitative
 - B) Quantitative-Continuous
 - C) Quantitative-Discrete

- 5) Classify the following variable according to whether it is qualitative, quantitative-discrete, or quantitative-continuous: The number of seats in a movie theater.
 - A) Qualitative
 - B) Quantitative-Continuous
 - C) Quantitative-Discrete

- 6) Every fifth teenager entering a concert is checked for possession of drugs. What sampling technique is used?
 - A) random
 - B) stratified
 - C) convenience
 - D) systematic
 - E) cluster

7) Construct the relative frequency distribution that corresponds to the following frequency distribution.

Incomes	Frequency
200-300	56
301-400	68
401-500	89
501-600	86
>600	10

A)

Incomes	Relative Frequency
200-300	12.5%
301-400	20.1%
401-500	37.3%
501-600	15.2%
>600	14.9%

B)

Incomes	Relative Frequency
200-300	28.34%
301-400	28.10%
401-500	3.26%
501-600	17.89%
>600	28.43%

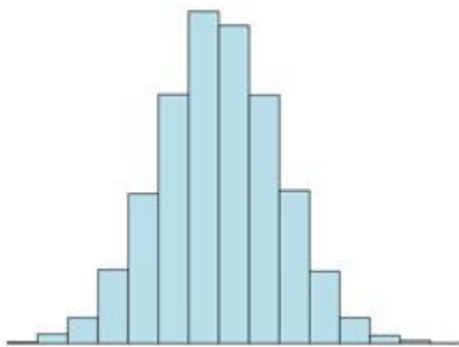
C)

Incomes	Relative Frequency
201-300	15.5%
301-400	22.1%
401-500	31.3%
501-600	16.2%
>600	14.9%

D)

Incomes	Relative Frequency
200-300	18.12%
301-400	22.01%
401-500	28.80%
501-600	27.83%
>600	3.24%

8) A histogram of a data set with 1,000 observations is as follows. This distribution is



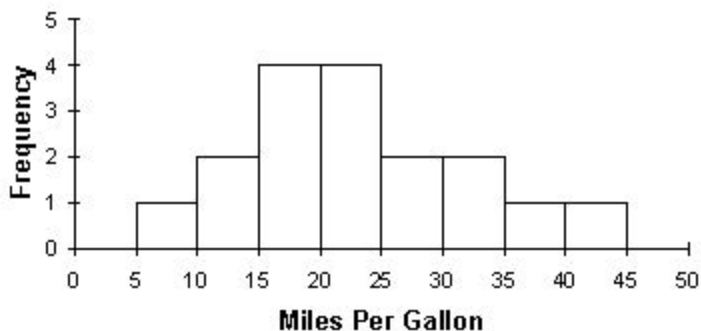
A) left-skewed

B) right-skewed

C) symmetric (approximately)

D) bimodal

9) A sample of vehicles was selected and fuel efficiency was recorded for each vehicle. How many vehicles got at least 35 miles per gallon?



- A) 2 B) 0 C) 7 D) 10

10) For a distribution that is left-skewed, what is the relationship between the mean and the median?

- A) The mean is larger than the median.
 B) The median is larger than the mean.
 C) The mean and the median are approximately the same.

11) The number of people per household was recorded for a sample of nineteen households. What is the median number of people per household in the sample?

No. of People	Frequency
1	2
2	7
3	3
4	3
5	2
6	1
7	1

- A) 3 B) 6 C) 5 D) 4

12) For the stem-and-leaf plot below, what is the shape of the distribution?

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1 | 2 3 3 3 4 5 6 8
2 | 6 6 6 6 7 8 9
3 | 0 1 1 2
4 | 7 7 7
5 | 6 6
6 | 3
    
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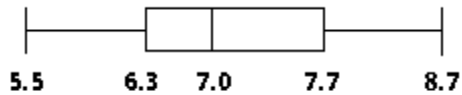
- A) right-skewed B) left-skewed C) symmetric D) bimodal

13) The weights (in pounds) of 30 newborn babies are listed below. Construct a boxplot for the data set.

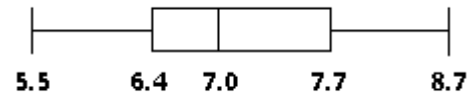
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5.5 5.7 5.8 5.9 6.1 6.1 6.3 6.4 6.5 6.6
6.7 6.7 6.7 6.9 7.0 7.0 7.0 7.1 7.2 7.2
7.4 7.5 7.7 7.7 7.8 8.0 8.1 8.1 8.3 8.7
    
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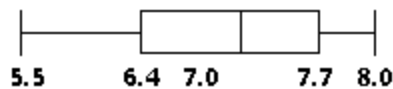
A)



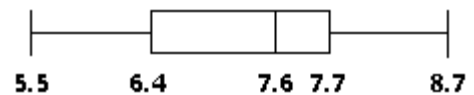
B)



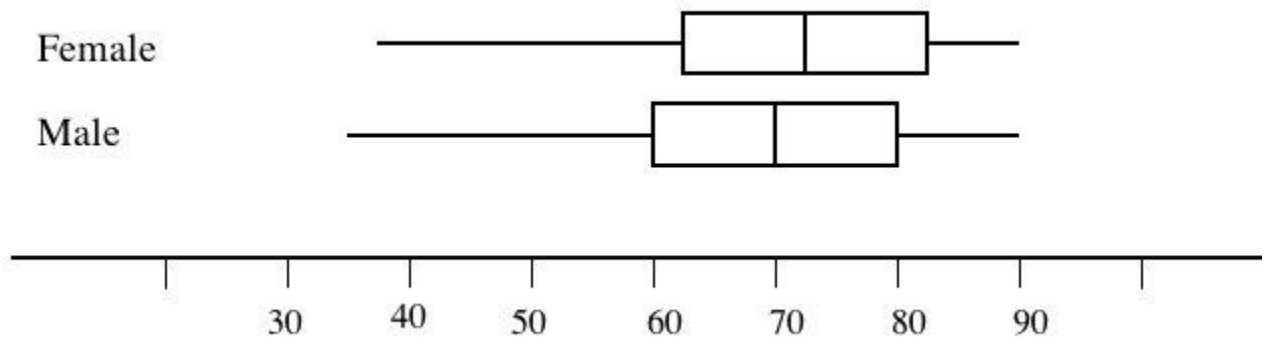
C)



D)



14) Consider the following box plots of the grades in a statistics course for each gender group. Which of the following is NOT correct?



- A) About 50% of the male students got grades below 70.
- B) The highest grade in female and male groups were about the same.
- C) About 50% of the male students got grades between 60 and 70.
- D) The median grade for the female students was higher than the median grade for the male students.

15) A(n) _____ of a probability experiment is the collection of all possible outcomes.

- A) Bernoulli space
- B) Sample space
- C) Prediction set
- D) Event set

16) A box contains 25 marbles: 20 blue and 5 red. What is the probability of getting two red marbles if sampling is done without replacement?

- A) 0.033
- B) 0.040
- C) 0.367
- D) 0.400

17) A fair coin is tossed two times in succession. Find the probability of getting two heads.

A) $\frac{1}{4}$

B) $\frac{1}{2}$

C) $\frac{3}{4}$

D) 1

For problems 18–21, refer to the following problem.

Four hundred accidents that occurred on a Saturday night were analyzed. Two items noted were the number of vehicles involved and whether the driver was female or male. The numbers are shown below:

Gender	Number of Vehicles Involved			Totals
	1	2	3 or more	
Female	58	93	19	170
Male	25	172	33	230
Totals	83	265	52	400

18) What is the probability that a randomly selected accident involved either 1 or 2 cars?

A) 0.870

B) 0.378

C) 0.493

D) 0.005

19) What is the probability that an accident involved a female driver?

A) 0.048

B) 0.145

C) 0.425

D) 0.365

20) What is the probability that an accident involved a female driver given that 3 or more cars were involved?

A) 0.13

B) 0.112

C) 0.365

D) 0.048

21) What is the probability that an accident involved a male driver or involved exactly 1 car?

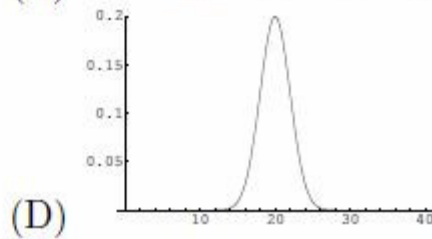
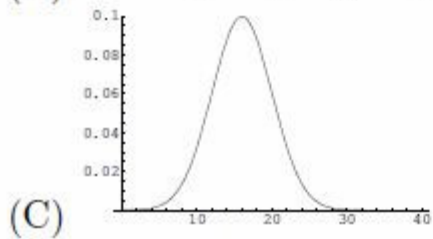
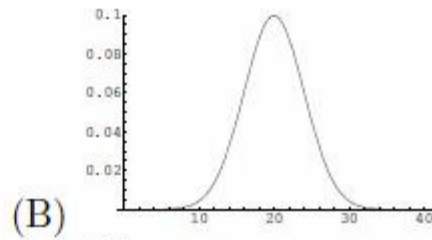
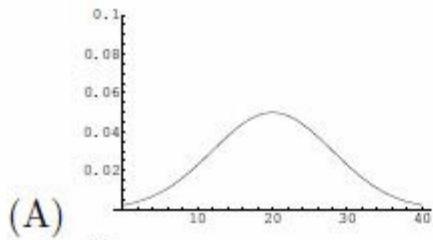
A) 0.720

B) 0.575

C) 0.063

D) 0.783

27) Let X be a normal random variable with a mean of 20 and a standard deviation of 4, which of the following could be the graph of the distribution of X ?



A) Graph A

B) Graph B

C) Graph C

D) Graph D

For problems 28 – 30, consider the following situation.

The length of time it takes college students to find a parking spot in the library parking lot follows a normal distribution with a mean of 3.5 minutes and a standard deviation of 1 minute.

28) Find the probability that a randomly selected college student will find a parking spot in the library parking lot in less than 3.0 minutes.

A) 0.1915

B) 0.3085

C) 0.2674

D) 0.6915

29) Find the probability that a randomly selected college student will find a parking spot in the library parking lot in more than 3.0 minutes.

A) 0.3085

B) 0.6915

C) 0.2674

D) 0.1915

30) Find the 25th percentile for the length of time it takes college students to find a parking spot in the library parking lot.

A) 4.76 minutes

B) 2.83 minutes

C) 3.02 minutes

D) 1.74 minutes

- 31) A random sample of 100 observations is to be drawn from a population with a mean of 40 and a standard deviation of 25. Suppose the sample mean of the 100 observations is computed. This procedure is repeated over and over again. What does the Central Limit Theorem say about the distribution of the sample means.?
- A) The distribution of sample means will be normal with a mean of 40 and a standard deviation (standard error) of 2.5.
 - B) The distribution of sample means will be normal with a mean of 40 and a standard deviation (standard error) of 25.
 - C) The distribution of sample means will be normal with a mean of 40 and a standard deviation (standard error) of 0.25.
- 32) Although a bag of corn chips indicates that it contains 15 ounces of chips, in reality the weights vary. Suppose that it is known that these weights have a normal distribution with a mean of 15 ounces and a standard deviation of 0.3 ounce. Suppose 100 bags of chips were randomly selected from this dispensing machine. Find the probability that the sample mean weight of these 100 bags exceeded 15.1 ounces.
- A) 0.0227
 - B) 0.1587
 - C) 0.3085
 - D) 0.0004
- 33) Suppose that a 95% confidence interval for a proportion was calculated to be (0.55, 0.65). What is the correct interpretation of this interval?
- A) 95% of sample proportions will be between 0.55 and 0.65.
 - B) There is a 95% probability that the true population proportion is between 0.55 and 0.65.
 - C) If this sampling procedure were repeated many times and many intervals were computed, 95% of those intervals would contain the population proportion.
- 34) Suppose that a 95% confidence interval for a proportion was calculated to be (0.55, 0.65). Would a 99% confidence interval be narrower or wider?
- A) Narrower
 - B) Wider
 - C) Cannot be determined
- 35) A random sample of 4000 citizens yielded 2250 who are in favor of gun control legislation. Let p be the population proportion of citizens who are in favor of gun control. Find a point estimate of p .
- A) 0.563
 - B) 0.393
 - C) 2250
 - D) 4000

36) A random sample of 4000 citizens yielded 2250 who are in favor of gun control legislation. Estimate the population proportion of all Americans who are in favor of gun control legislation using a 90% confidence interval.

- A) (0.542, 0.584) B) (0.323, 0.803) C) (0.550, 0.576) D) (0.158, 0.968)

37) The principal randomly selected six students to take an aptitude test. Their scores were:
87, 79, 68, 75, 74, 76

Find a point estimate of the population mean score of all students taking this exam.

- A) 76.5 B) 62.8 C) 77.1 D) 76.4

38) A medical researcher measured the pulse rates (beats per minute) of a sample of 41 randomly selected adults and found the average pulse rate for the sample was equal to 72.3 beats per minute. The sample standard deviation was 2.5 beats per minute. Create a 90% confidence interval for the population mean pulse rate of all adults.

- A) (68.4, 76.2) B) (69.6, 75.0) C) (70.8, 72.3) D) (71.6, 73.0)

39) A laboratory tested 74 chicken eggs and found that the mean amount of cholesterol was 219.0 milligrams. Suppose that the population standard deviation is known to be 16.8 milligrams. Construct a 95 percent confidence interval for the true mean cholesterol content, μ , of all such eggs.

- A) (213.5, 224.5) B) (217.3, 220.7) C) (215.2, 222.8) D) (200.0, 238.0)

40) When conducting a hypothesis test, which of the following statements is correct?

- A) the larger the p-value, the stronger the evidence against the null hypothesis
B) a large p-value indicates that the data is consistent with the alternative hypothesis
C) the p-value measures the probability that the alternative hypothesis is true
D) an extremely small p-value indicates that the sample data differ significantly from that expected if the null hypothesis were true

41) A car company claims that its new sedan will average more than 30 miles per gallon in the city. What are the null and alternative hypotheses?

- A) $H_0: \mu < 30$
 $H_1: \mu \geq 30$ B) $H_0: \mu = 30$
 $H_1: \mu < 30$ C) $H_0: \mu > 30$
 $H_1: \mu \leq 30$ D) $H_0: \mu = 30$
 $H_1: \mu > 30$

42) Refer to problem 41. Suppose that a sample of 45 sedans resulted in a sample mean of 31.4 miles per gallon and a sample standard deviation of 4.2 miles per gallon. What is the value of the test statistic?

A) $z = -2.24$

B) $t = -2.24$

C) $z = 2.24$

D) $t = 2.24$

43) Refer to problem 41. Suppose that a hypothesis test is conducted and a p-value of 0.0152 is obtained. At a 5% level of significance, what is the conclusion?

A) Reject the null hypothesis. The sample data support the claim that the population mean mileage for the new sedans will be more than 30 miles per gallon in the city.

B) Reject the null hypothesis. There is sufficient evidence to reject the claim that the population mean mileage for the new sedans will be more 30 miles per gallon in the city.

C) Fail to reject the null hypothesis. There is not sufficient evidence reject the claim that the population mean mileage for the new sedans will be more than 30 miles per gallon in the city.

D) Fail to reject the null hypothesis. There is not sufficient evidence to support the claim that the population mean mileage for the new sedans will be more than 30 miles per gallon in the city.

44) A psychologist claims that more than 6.3 percent of the adult population suffers extreme shyness. What are the null and alternative hypotheses?

A) $H_0: p = 0.063$

B) $H_0: p > 0.063$

C) $H_0: p < 0.063$

D) $H_0: p = 0.063$

$H_1: p < 0.063$

$H_1: p \leq 0.063$

$H_1: p \geq 0.063$

$H_1: p > 0.063$

45) Refer to problem 44. Suppose that a sample of 200 people found that 15 suffer from extreme shyness. What is the value of the test statistic?

A) $z = 0.70$

B) $z = 1.27$

C) $z = 2.44$

D) $z = 3.81$

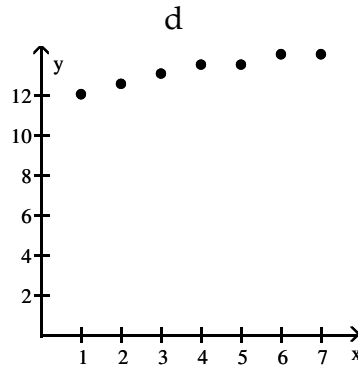
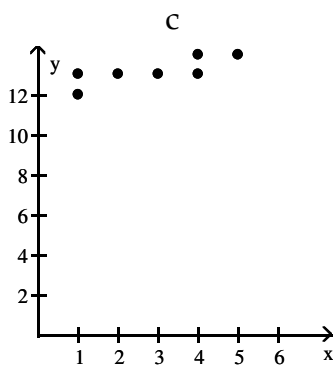
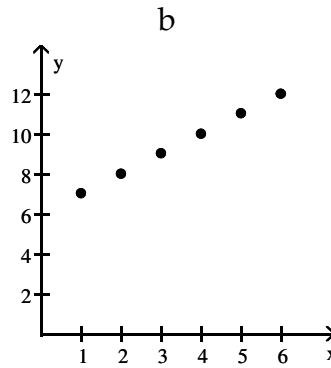
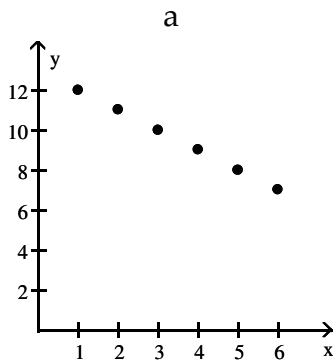
- 46) Refer to problem 44. Suppose that a hypothesis test is conducted and a p-value of 0.2424 is obtained. At a 5% level of significance, what is the conclusion?
- A) Reject the null hypothesis. There is sufficient evidence to support the claim that the percentage all adults suffering from extreme shyness is more than 6.3 percent.
 - B) Reject the null hypothesis. There is sufficient evidence to reject the claim that the percentage all adults suffering from extreme shyness is more than 6.3 percent.
 - C) Fail to reject the null hypothesis. There is not sufficient evidence to support the claim that the percentage all adults suffering from extreme shyness is more than 6.3 percent.
 - D) Fail to reject the null hypothesis. There is not sufficient evidence to reject the claim that the percentage all adults suffering from extreme shyness is more than 6.3 percent.
- 47) Refer to problem 44. What is the Type I error in this situation?
- A) Concluding that the percentage of all adults suffering from extreme shyness is more than 6.3 percent when in fact it isn't.
 - B) Concluding that the percentage of all adults suffering from extreme shyness is more than 6.3 percent when in fact it is.
 - C) Failing to prove that the percentage of all adults suffering from extreme shyness is more than 6.3 percent, when in fact it isn't.
 - D) Failing to prove that the percentage of all adults suffering from extreme shyness is more than 6.3 percent, when in fact it is.
- 48) The correlation coefficient provides
- A) a measure of the strength of the linear association between two qualitative random variables.
 - B) a measure of the strength of the linear association between two quantitative random variables.
 - C) a measure of the strength of the linear association between a qualitative and a quantitative random variable.
- 49) If the correlation between body weight and annual income were close to one, we could conclude that
- A) high incomes cause people to eat more food.
 - B) low incomes cause people to eat less food.
 - C) high income people tend to be heavier than low income people, on average.
 - D) high incomes cause people to gain weight.

50) If we were interested predicting an individual's salary using the number of years of education that individual has, years of education would be the _____ variable.

- A) Independent (Explanatory)
- B) Dependent (Response)
- C) Qualitative

Use the scatter diagrams shown, labeled a through d to solve the problem.

51)



f

In which scatter diagram is $r = -1$?

- A) a
- B) d
- C) b
- D) c

52) A study was conducted to see if there is a relationship between age (X) and pulse (Y). A sample of 30 women was taken, and the following output was obtained after conducting a correlation and regression analysis.

Simple linear regression results:

Dependent Variable: PULSE

Independent Variable: AGE

PULSE = 66.03256 + 0.30902755 AGE

R (correlation coefficient) = 0.3079

R-sq = 0.09481735

Determine if r is significant at $\alpha = 0.05$. If it is, what is the equation of the least-squares regression line?

A) $\hat{y} = 66.0x + 0.3$

B) $\hat{y} = 66.0 + 0.3x$

C) $\hat{y} = 66.0 + 0.3$

D) A regression line should not be used because the correlation coefficient (r) is not significant.

53) Suppose that there is a significant linear relationship between dexterity scores (X) and productivity scores (Y) for the employees of a company. The equation of the least-squares regression line is $\hat{y} = 1.91x + 5.50$. What is the best predicted productivity score for a person whose dexterity score is 34?

A) 56.30

B) 188.91

C) 58.20

D) 70.44