

1 (8 Points)

An educational psychologist does a survey to estimate the average length of time that college students study each week. She randomly selects 100 students that are enrolled at her university for the survey.

For what population is this a representative sample?

- [1] Students who participated in the survey.
- [2] All students at the university.
- [3] All college students in the United States.
- [4] The average length of time that college students study each week.
- [0] no answer or skip this item

Submit Answer

2 (8 Points)

A(n) _____ is where data are collected from every member of a population.

Choose the term that best completes the sentence.

- [1] stratified random sample
- [2] census
- [3] observational study
- [4] simple random sample
- [0] no answer or skip this item

Submit Answer

3 (8 Points)

A study is done to compare the cholesterol levels in people who follow a particular diet plan, to the cholesterol levels in people who do not follow this plan. The researcher is able to study 200 individuals of each type.

Other factors that may affect cholesterol levels are an individual's weight, exercise habits and stress levels. The weight characteristics of the two groups of people are similar, their exercise habits are different and their stress levels are unknown.

In this study, a confounding factor is:

- [1] exercise
- [2] cholesterol level
- [3] weight
- [4] diet plan
- [0] no answer or skip this item

Submit Answer

4 (8 Points)

A study is conducted to determine whether eating broccoli at least once a week reduces the risk of cancer for middle-aged men.

Are the variables of interest qualitative or quantitative?

- [1] Both variables are qualitative.
- [2] Both variables are quantitative.
- [3] One variable is quantitative and the other qualitative.
- [4] The variables are neither quantitative nor qualitative.
- [0] no answer or skip this item

Submit Answer

5 (8 Points)

Two computer systems operate independently. Suppose the probability that the first system fails is 0.001 and the probability that the second system fails is 0.002.

What is the probability that at least one system will function?

- [1] 0.003
- [2] 0.997
- [3] 0.999998
- [4] 0.000002
- [0] no answer or skip this item

Submit Answer

6 (8 Points)

Which of the following would not be considered a characteristic of a confidence interval?

- [1] A confidence interval can be created for any population parameter.
- [2] The confidence level is usually reported as a percentage.
- [3] Common confidence levels are 90%, 95%, and 99%.
- [4] A confidence interval consists of the following critical parts: lower value, upper value, confidence level, and population parameter.
- [0] no answer or skip this item

Submit Answer

7 (8 Points)

A manufacturer of electronic communication equipment, wishing to market a new product, contacts a random sample of its current customers to determine how many now use a DVD player or a large screen TV.

If 57% own DVD players, 25% own large screen TVs and 14% own both, what is the probability that a randomly selected customer will own a DVD player or a large screen TV?

- [1] about 0.14
- [2] about 0.46
- [3] about 0.65
- [4] about 0.68
- [5] about 0.96
- [0] no answer or skip this item

Submit Answer

8 (8 Points)

Lie detector tests have often been criticized as unreliable. It is suspected that false positives, results indicating the subjects were lying when they were not, occur far too frequently. Suppose 300 people submitted to a lie detector test, with some being told to always tell the truth and others to lie to certain questions. The individuals administering the lie detector test were not told who was truthful and who was not truthful. Positive results indicate the subject is lying.

Lie Detector Testing	Lied	Truthful	Total
Positive Test	59	18	77
Negative Test	7	216	223
Total	66	234	300

Among people that tested positive, what is the probability that a person really lied?

- [1] about 0.8939
- [2] about 0.7662
- [3] about 0.1061
- [4] about 0.0233
- [0] no answer or skip this item

Submit Answer

9 (8 Points)

Suppose the amount of detergent delivered through a high pressure sprayer is a uniform distribution. If X = gallons of detergent per minute and X has values between 5.0 and 6.0 gallons which are equally probable. The probability density function is $f(x) = 1$ for $5.0 < x < 6.0$, $f(x) = 0$ otherwise.

What is the probability that more than 5.8 gallons of detergent per minute are dispensed?

- [1] 0.1
- [2] 0.2
- [3] 0.3
- [4] 0.7
- [0] no answer or skip this item

Submit Answer

10 (8 Points)

A researcher calculated a 95% confidence interval for the difference in the mean starting salaries for graduates from two different majors, civil engineering and mechanical engineering. The confidence interval for the difference, civil engineering - mechanical engineering, went from -3500 to +2000.

Which of the following statements can the researcher make?

- [1] Graduates in civil engineering have a lower starting salary than those who graduate in mechanical engineering.
- [2] Graduates in civil engineering have a higher starting salary than those who graduate in mechanical engineering.
- [3] Graduates in civil engineering and graduates in mechanical engineering do not differ significantly in starting salaries.
- [4] No comparison can be made. We need to know the p-value.
- [0] no answer or skip this item

Submit Answer

11 (8 Points)

Suppose that the probability of a prior conviction for driving under the influence of alcohol is .02 and that the police stop 4 motorists who are driving under the influence of alcohol.

What is the probability that at least one of these 4 motorists has a prior conviction?

- [1] about 0.000001
- [2] about 0.0016
- [3] about 0.0776
- [4] about 0.9984
- [5] about 0.99999984
- [0] no answer or skip this item

Submit Answer

12 (8 Points)

Imagine a histogram of the sample means of ideal weights from 1,000 different random samples of $n = 25$ students.

Would the center and spread of the histogram of $n = 25$ differ from the center and spread of the histogram for $n = 100$?

- [1] For each sample size, the center of the distribution is different. For $n = 25$, there is more variation among the different sample means than when $n = 100$.
- [2] For each sample size, the distribution is centered at about the same point, which also is approximately the population mean. For $n = 25$, there is more variation among the different sample means than when $n = 100$.
- [3] For each sample size, the distribution is centered at about the same point, which also is approximately the population mean. For $n = 25$, there is less variation among the different sample means than when $n = 100$.
- [4] For each sample size, the center of the distribution is different. For $n = 25$, there is less variation among the different sample means than when $n = 100$.
- [0] no answer or skip this item

Submit Answer

13 (8 Points)

A bowl contains a huge number of coins. One third of the coins are pennies, one third are nickels and one third are dimes. The population mean of these coins is \$0.0533 (5.33 c), and the standard deviation is \$0.028 (2.8 c). Imagine choosing a sample of 4 coins from the bowl, where each coin has an equal chance of being picked.

The standard deviation of the sum of the coins is closest to:

- [1] \$0.028
- [2] \$0.056
- [3] \$0.56
- [4] \$5.60
- [5] \$11.20
- [0] no answer or skip this item

Submit Answer

14 (8 Points)

Assume that 38% of all faculty employed at universities are female. The females have value '1', and males have value '0.' Thus the population mean is 0.38. The population standard deviation is 0.485. Assume we are choosing a sample of size 100 employees.

To answer this question, you should use a normal curve calculator or a normal table of your choice.

**What is the probability that the proportion is in the interval from 28% to 48%?
(Choose the closest answer!)**

- [1] almost 0
- [2] about 0.5
- [3] about 0.95
- [4] almost 1
- [0] no answer or skip this item

Submit Answer

15 (8 Points)

What are marginal totals?

- [1] A computed total for each cell of a contingency table that gives the total number of observations we'd expect if there were no relationship between the two categorical variables.
- [2] The numerical (totals) values in the cells within a table.
- [3] The totals in a given category within a table, since they are the totals written into the right (for the rows) or bottom (for the columns) margins of the table.
- [4] None of the above.
- [0] no answer or skip this item

Submit Answer

16 (8 Points)

A coin is tossed 10,000 times to see if it is fair (i.e., 'heads' and 'tails' are equally likely). In particular, the investigator thought that a head came up more often than it should. Let p be the probability of a head. If the coin is fair, then $p = 1/2$.

What is the alternative hypothesis?

- [1] $H_a: p = 1/2$
- [2] $H_a: p < 1/2$
- [3] $H_a: p > 1/2$
- [4] $H_a: p \neq 1/2$
- [0] no answer or skip this item

Submit Answer

17 (8 Points)

Researchers are interested in testing whether there are an excessive number of rat hairs in jars of peanut butter produced at a particular factory. They examine a random sample of 324 jars, and find an average of 6.3 rat hairs in each jar. The sample standard deviation is 3. They would like to do a one-sided z-test of whether the population average is equal to five (the maximum permitted by law) versus the alternative that it is greater than five.

What is the standard error of the sample mean?

- [1] about 1.3
- [2] about 0.1667
- [3] about 0.1538
- [4] about 0.014
- [5] about 0.0118
- [0] no answer or skip this item

Submit Answer

18 (8 Points)

The recommended dietary allowance of folic acid for adult females is 400 mcg. Folic acid is found naturally in leafy dark green vegetables, legumes (dried beans and peas), citrus fruits and juices, and most berries. A vitamin supplement is supposed to contain $m = 400$ mcg of folic acid.

A random sample of 100 such vitamin tablets was obtained and the amount of folic acid contained in each tablet was determined. The sample mean was 399.92 mcg, and the sample standard deviation was $s = .5$ mcg. The question of interest is whether this supplement provides a different amount of folic acid than what it is supposed to do.

What are the null and the alternative hypotheses?

- [1] H_0 : Population mean = 400; H_a : Population mean = 399.92
- [2] H_0 : Population mean \neq 400; H_a : Population mean = 400
- [3] H_0 : Population mean = 400; H_a : Population mean $>$ 400
- [4] H_0 : Population mean = 400; H_a : Population mean $<$ 400
- [5] H_0 : Population mean = 400; H_a : Population mean \neq 400
- [0] no answer or skip this item

Submit Answer

19 (8 Points)

In a study, participants were asked:

Do you favor a law making English the official language of the United States, meaning government business should be conducted in English only, or do you oppose such a law?

Are you a college graduate?

English Only?	College Graduate	Not a College Graduate	Total
No	426	174	600
Yes	417	183	600
Total	843	357	1200

The table above contains data on 1200 people who are categorized by whether or not they favor a law making English the official language and whether they are a college graduate.

To answer this question, you should use a calculator or an interactive of your choice.

What is the decision?

[1] The chi-square statistic is 0.5698. The p-value is 0.323. Do not reject the null hypothesis, conclude that there is no relationship between opinion on English only and education.

[2] The chi-square statistic is 0.5698. The p-value is 0.323. Reject the null hypothesis, conclude that there is a relationship between opinion on English only and education.

[3] The chi-square statistic is 0.323. The p-value is 0.5698. Do not reject the null hypothesis, conclude that there is no relationship between opinion on English only and education.

[4] The chi-square statistic is 0.323. The p-value is 0.5698. Reject the null hypothesis, conclude that there is a relationship between opinion on English only and education.

[0] no answer or skip this item

Submit Answer

20 (8 Points)

What is the average age at the time a person is married for the first time? This question was posed to a random selection of 36 people. Use this Minitab output to answer the question.

Test of mu = 23 vs mu > 23						
N	Mean	StDev	SE Mean	T	P	
36	25.16	3.85	0.642	-3.37	0.0003	

How can we interpret the p-value of this test?

- [1] If the population mean is really 25.16, the probability is 0.0003 that the mean of the 36 ages could be different from 23.
- [2] If the population mean is really 25.16, the probability is 0.0003 that the mean of the 36 ages is 23.
- [3] If the population mean is really 23, the probability is 0.0003 that the mean of the 36 ages could be different from 23.
- [4] If the population mean is really 23, the probability is 0.0003 that the mean of the 36 ages could be more than 23.
- [5] If the population mean is really 23, the probability is 0.0003 that the mean of the 36 ages could be different from 25.16.
- [6] If the population mean is really 23, the probability is 0.0003 that the mean of the 36 ages could be more than 25.16.
- [0] no answer or skip this item

Submit Answer

21 (8 Points)

The table below shows the results of four random samples conducted by four different instructors who want to determine whether students brush their teeth after every meal:

Sample	Brush After Every Meal	Don't Brush After Every Meal
No. 1	5	4
No. 2	70	112
No. 3	80	125
No. 4	6000	9000

For which of the above samples would it be inappropriate to use the z-interval to estimate the true proportion of students who brush their teeth after every meal?

- [1] Sample No. 1
- [2] Sample No. 2
- [3] Sample No. 3
- [4] Sample No. 4
- [0] no answer or skip this item

Submit Answer

22 (8 Points)

Imagine a population of grasshoppers that starts with eight grasshoppers. Every day, the number of grasshoppers doubles. (Thus after one day, there are 16 grasshoppers, and after two days, there are 32 grasshoppers.) Let Y be the number of grasshoppers and X be the number of days that have passed.

Is there a linear model $Y = a + b \times X + e$ that describes this relationship? If so, what are a and b ?

- [1] Yes. $a = 0$ and $b = 16$.
- [2] Yes. $a = 8$ and $b = 2$.
- [3] Yes. $a = 2$ and $b = 32$.
- [4] No, there is no linear relationship.
- [0] no answer or skip this item

Submit Answer

23 (8 Points)

A chi-square test for independence in a 2x2 table based on 1000 observations resulted in a p-value of 0.02.

If the sample size were to be increased to 2000 observations, and the proportions in each cell remained the same, it is likely that:

- [1] The p-value would increase.
- [2] The p-value would decrease.
- [3] The p-value would remain about the same.
- [4] There is no way to determine whether the p-value would increase or decrease.
- [0] no answer or skip this item

Submit Answer

24 (8 Points)

The height and weight of a group of basketball players are related by the linear model

$$Y = -208 + 5 \times X + e$$

where X is height (in inches) and Y is weight (in pounds).

What is the expected weight difference between a person 68 inches tall and a person 72 inches tall?

- [1] 142 pounds
- [2] 132 pounds
- [3] 20 pounds
- [4] 13 pounds
- [5] 10 pounds
- [0] no answer or skip this item

Submit Answer

25 (8 Points)

In data on 60 locations, the least squares line for $X = \text{Rain}$ versus $Y = \text{Mortality}$ is

$$\text{Mortality} = 850 + 2.37 \times (\text{Rain}).$$

What is the expected *Mortality* when *Rain* = 1.0?

- [1] 2.37
- [2] 850.00
- [3] 852.37
- [4] 2014.50
- [0] no answer or skip this item

Submit Answer

26 (12 Points)

The Interactive box below displays a histogram with the variable PctCities, the percentage of population that lives in metropolitan areas.

Estimate (a) the 30th and (b) the 80th percentiles from this histogram.

CLICK HERE FOR
**Interactive
Tool!**

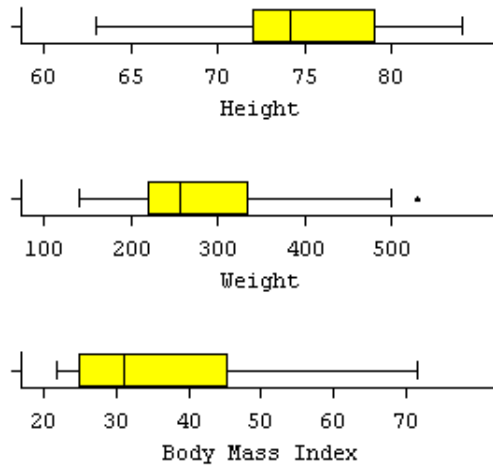
Submit Answer

27 (12 Points)

Below are **Heights** in inches and **Weights** in pounds of 132 professional male athletes, in two sports. Also included are their **body mass index** numbers, which are defined by

$$\text{BMI} = \text{Body Mass Index} = (\text{Weight in Pounds}) * 703 / ((\text{Height in inches})^2)$$

BMI is supposed to measure how overweight or underweight a person is. A value in the range 20-25 is fine; more is deemed overweight; under 20 is deemed underweight. It is fairly easy to be overweight under this measure. Here are boxplots for the three variables:



- (a) What is the median BMI, approximately?
- (b) What is the maximum BMI, approximately?
- (c) About what percentage of these athletes have a BMI of more than 25?

Submit Answer

28 (12 Points)

Use the **Interactive Tool** for the Chi-Square distribution below.

What is (a) the chance that the sum of the squares of 5 independent standard normals is greater than 6 and (b) what are the degrees of freedom we use for our calculation?

CLICK HERE FOR
Interactive
Tool!

Submit Answer

29 (12 Points)

In 1989, scientists identified the genetic cause of cystic fibrosis (CF): an error on chromosome 7. This has helped identify carriers of the gene within high-risk families. A new genetic test for CF is 89% accurate in identifying carriers.

Suppose a husband and wife are both carriers. What is the chance that both of them test positive and will be identified as carrier?

Submit Answer

30 (12 Points)

The heights of women have a distribution that is approximated by a normal curve with a mean of 63 inches and a standard deviation equal to 2.9 inches.

To answer this question, you should use a normal curve calculator or a normal table of your choice.

About what proportion of women are between 61 and 68 inches tall?

Submit Answer

31 (12 Points)

The heights of women have a distribution that is approximated by a normal curve with a mean of 63 inches and a standard deviation equal to 2.9 inches.

To answer this question, you should use a normal curve calculator or a normal table of your choice.

For women, approximately what is the 20th percentile of heights?

Submit Answer

32 (12 Points)

A researcher performs the following hypothesis test:

H_0 : The proportion of cell phone users is 0.32. vs.

H_a : The proportion of cell phone users is greater than 0.32.

The researcher randomly samples 100 people and determines whether or not they use cell phones. The proportion of cell phone users in the sample is 0.36. If the null hypothesis is true, the standard error of the proportions is 0.047.

What is the value of the z-statistic?

Submit Answer

33 (12 Points)

A machine produces parts. The probability that an individual part is defective is .008. If a random sample of 10 parts contains one or more defective parts, the machine is shut down for repairs.

What is the probability that the machine will be shut down for repairs based on one sample of 10 parts?

Submit Answer

34 (12 Points)

A null hypothesis is that the mean systolic blood pressure of women is 115. The alternative hypothesis is that the mean is higher than 115. Based on a sample of 10 women, a t-test is performed. The sample mean is 117.8 and the p-value is 0.42.

What is the appropriate conclusion?

Submit Answer

35 (12 Points)

The price of a jar of spaghetti sauce has a linear relationship with the weight of the spaghetti sauce in the jar, that is,

$$Y = a + b \times X,$$

where $Y = \text{Price in dollars}$ and $X = \text{Weight of contents in ounces}$.

A 24 ounce jar of spaghetti sauce sells for \$1.25, and a 32 ounce jar of spaghetti sauce sells for \$1.75.

How much does a 48 ounce jar of spaghetti sauce sell for?

Submit Answer

36 (12 Points)

Use **WebStat**. Load from "Data > Sample Data" the data set "**Textbook_spending_4_majors.dat**". This is one out of 8 questions that will work with this data set.

Calculate (and report) the mean for the variables civil-eng, chem-eng, elect-eng, and comp-eng, representing textbook spendings from samples of students within four different majors.

Submit Answer

37 (12 Points)

Use **WebStat**. Load from "Data > Sample Data" the data set "**Textbook_spending_4_majors.dat**". This is one out of 8 questions that will work with this data set.

Calculate (and report) the median for the variables civil-eng, chem-eng, elect-eng, and comp-eng.

Submit Answer

38 (12 Points)

Use **WebStat**. Load from "Data > Sample Data" the data set "**Textbook_spending_4_majors.dat**". This is one out of 8 questions that will work with this data set.

Compare the means and medians for the variables civil-eng, chem-eng, elect-eng, and comp-eng. Are they similar or do they differ much? Just based on this comparison, what could we conclude about the symmetry of the data for the four variables?

Submit Answer

39 (12 Points)

Use **WebStat**. Load from "Data > Sample Data" the data set "**Textbook_spending_4_majors.dat**". This is one out of 8 questions that will work with this data set.

Construct boxplots of the variables civil-eng, chem-eng, elect-eng, and comp-eng, using fences to identify outliers. Are there any outliers - if so, specify them and indicate for which of the variables they have been observed.

Submit Answer

40 (12 Points)

Use **WebStat**. Load from "Data > Sample Data" the data set "**Textbook_spending_4_majors.dat**". This is one out of 8 questions that will work with this data set.

The faculty of the civil-eng department claim that their students on average spend \$200 on textbooks while the civil-eng students think they have to spend more than \$200 on textbooks. Conduct a test for the mean textbook spendings for all civil-eng students (assuming the data originates from a random sample from all civil-eng students), where H_0 : mean = 200 versus H_1 : mean greater than 200. Can we use a z-test here (if yes, do so) or do we have to use a t-test (in this case, indicate the degrees of freedom). Explain. Report the p-value for the test you choose and provide a verbal conclusion.

Submit Answer

41 (12 Points)

Use **WebStat**. Load from "Data > Sample Data" the data set "**Textbook_spending_4_majors.dat**". This is one out of 8 questions that will work with this data set.

The faculty of the comp-eng department claim that their students on average spend the same amount of money on textbooks as the students from elect-eng. To verify their claim, they tell us to construct (and report) 95% confidence intervals (based on t-intervals) for the mean textbook spendings for all comp-eng students and for the mean textbook spendings for all elect-eng students (assuming the data originates from random samples from all students from comp-eng and elect-eng, respectively). Do these two confidence intervals confirm the claim? Explain your answer.

Submit Answer

42 (12 Points)

Use **WebStat**. Load from "Data > Sample Data" the data set "**Textbook_spending_4_majors.dat**". This is one out of 8 questions that will work with this data set.

Assume you manually have to construct a 80% confidence interval for the mean textbook spendings of all chem-eng students (assuming the data originates from a random sample from all chem-eng students), based on a t-interval. The general formula is "sample mean +/- multiplier * standard error". Indicate the value for the multiplier and show how you would calculate the standard error.

Submit Answer

43 (12 Points)

Use **WebStat**. Load from "Data > Sample Data" the data set "**Textbook_spending_4_majors.dat**". This is one out of 8 questions that will work with this data set.

Do you think that we would still get the same outcomes with respect to the claims of the civil-eng faculty (that their students spend \$200 on textbooks) and the comp-eng faculty (that their students spend as much on textbooks as the elect-eng students) if we would deal with greater sample sizes, e.g., 50 students from each major? Yes or no - and explain.

Submit Answer

44 (12 Points)

Use **WebStat**. Load from "Data > Sample Data" the data set "**Air_pressure_boiling_point.dat**". This is one out of 7 questions that will work with this data set.

To better interpret your results, you should keep in mind that the boiling point of water is 212 degrees Fahrenheit (i.e., 100 degrees Celsius) at sea level.

Construct a scatterplot of AirPressure (x) versus BoilingPoint (y). Describe the overall appearance of this plot. Is there an apparent trend? Are there any obvious outliers?

Submit Answer

45 (12 Points)

Use **WebStat**. Load from "Data > Sample Data" the data set "**Air_pressure_boiling_point.dat**". This is one out of 7 questions that will work with this data set.

Calculate (and indicate) the correlation between AirPressure and BoilingPoint. What does this value indicate?

Submit Answer

46 (12 Points)

Use **WebStat**. Load from "Data > Sample Data" the data set "**Air_pressure_boiling_point.dat**". This is one out of 7 questions that will work with this data set.

Construct (and report) the regression line, predicting BoilingPoint from AirPressure. Do we have a significant slope? And can we use the regression equation to predict BoilingPoint from AirPressure?

Submit Answer

47 (12 Points)

Use **WebStat**. Load from "Data > Sample Data" the data set "**Air_pressure_boiling_point.dat**". This is one out of 7 questions that will work with this data set.

Based on your regression calculations above, what would be the predicted BoilingPoints for AirPressures of 25, 30, and 35? Which of these three predicted values is the least reliable? Explain why.

Submit Answer

48 (12 Points)

Use **WebStat**. Load from "Data > Sample Data" the data set "**Air_pressure_boiling_point.dat**". This is one out of 7 questions that will work with this data set.

In an introductory Physics class, an undergraduate student experimentally determines that for AirPressure 27, the BoilingPoint is 208. Based on your regression calculations above, is this a surprising result? Explain why or why not.

Submit Answer

49 (12 Points)

Use **WebStat**. Load from "Data > Sample Data" the data set "**Air_pressure_boiling_point.dat**". This is one out of 7 questions that will work with this data set.

Construct a histogram of AirPressure. Describe the overall shape of the histogram (i.e., is it fairly symmetric, skewed towards the higher values, skewed towards the lower values)? Are there any outliers? What is the modal bar?

Submit Answer

50 (12 Points)

Use **WebStat**. Load from "Data > Sample Data" the data set "**Air_pressure_boiling_point.dat**". This is one out of 7 questions that will work with this data set.

Construct a boxplot of BoilingPoint. Use fences to identify outliers. Describe the overall shape of the boxplot (i.e., is it fairly symmetric, skewed towards the higher values, skewed towards the lower values)? Are there any outliers?

Submit Answer

**When you are done answering all questions above to your satisfaction,
press the button below to complete your test.**

Mark Test Completed