

As part of the study on ongoing fright symptoms due to exposure to horror movies at a young age, the following table was presented to describe the lasting impact these movies have had during bedtime and waking life:

	Waking symptoms	
	Yes	No
Bedtime symptoms	Yes	34
	No	32
No		34
Yes		19

(a) What percent of the students have lasting waking-life symptoms? (Round your answer to two decimal places.) %

(b) What percent of the students have both waking-life and bedtime symptoms? (Round your answer to two decimal places.) %

(c) Test whether there is an association between waking-life and bedtime symptoms. State the null and alternative hypotheses. (Use $\alpha = 0.01$.)

Null Hypothesis:

☐

H_0 : Bedtime symptoms cause waking symptoms.

☐

H_0 : Waking symptoms cause bedtime symptoms.

☐

H_0 : There is no relationship between waking and bedtime symptoms.

☒

H_0 : There is a relationship between waking and bedtime symptoms.

Alternative Hypothesis:

☐

H_a : Waking symptoms cause bedtime symptoms.

☒

H_a : There is a relationship between waking and bedtime symptoms.

☐

H_a : There is no relationship between waking and bedtime symptoms.

☐

H_a : Bedtime symptoms cause waking symptoms.

State the χ^2 statistic and the P -value. (Round your answers for χ^2 and the P -value to three decimal places.)

$\chi^2 =$
 $df =$
 $P =$

Conclusion:

- ☒ We do not have enough evidence to conclude that there is a relationship.
☐ We have enough evidence to conclude that there is a relationship.



In what ways do advertisers in magazines use sexual imagery to appeal to youth? One study classified each of 1509 full-page or larger ads as "not sexual" or "sexual," according to the amount and style of the dress of the male or female model in the ad. The ads were also classified according to the target readership of the magazine. Here is the two-way table of counts.

Magazine readership					
Model dress	General interest	Total			
		Not sexual	Sexual	Total	
Women		350	210	560	592
Men		252	105	357	357
General		1106	403		1509

(a) Summarize the data numerically and graphically. (Compute the conditional distribution of model dress for each audience. Round your answers to three decimal places.)

	Women		Men		General	
	Not sexual	Sexual	Not sexual	Sexual	Not sexual	Sexual

(b) Perform the significance test that compares the model dress for the three categories of magazine readership. Summarize the results of your test and give your conclusion. (Use $\alpha = 0.01$. Round your value for χ^2 to two decimal places, and round your P -value to four decimal places.)

$\chi^2 =$
 P -value =

Conclusion

(c) All of the ads were taken from the March, July, and November issues of six magazines in one year. Discuss this fact from the viewpoint of the validity of the significance test and the interpretation of the results.

- ☐ This is an SRS. This gives us reason to believe our conclusions might be suspect.
- ☐ This is not an SRS. This gives us reason to believe our conclusions might be suspect.
- ☒ This is not an SRS. This gives us reason to believe our conclusions might be suspect.
- ☐ This is an SRS. This gives us no reason to believe our conclusions are suspect.

- ☐ Fail to reject the null hypothesis. There is significant evidence of an association between target audience and model dress.
- ☒ Reject the null hypothesis. There is not significant evidence of an association between target audience and model dress.
- ☐ Fail to reject the null hypothesis. There is not significant evidence of an association between target audience and model dress.
- ☐ Reject the null hypothesis. There is significant evidence of an association between target audience and model dress.

The Leaning Tower of Pisa is an architectural wonder. Engineers concerned about the tower's stability have done extensive studies of its increasing tilt. Measurements of the lean of the tower over time provide much useful information. The following table gives measurements for the years 1975 to 1987. The variable "lean" represents the difference between where a point on the tower would be if the tower were straight and where it actually is. The data are coded as tenths of a millimeter in excess of 2.9 meters, so that the 1975 lean, which was 2.9642 meters, appears in the table as 642. Only the last two digits of the year were entered into the computer. ([data321.dat](#))

(a) Plot the data. Consider whether or not the trend in lean over time appears to be linear. (Do this on paper. Your instructor may ask you to turn in this graph.)

(b) What is the equation of the least-squares line? (Round your answers to two

decimal places.)
 $y = \boxed{} + \boxed{}x$

What percent of the variation in lean is explained by this line? (Round your answer to one decimal place.)
 $\boxed{}\%$

(c) Give a 99% confidence interval for the average rate of change (tenths of a millimeter per year) of the lean. (Round your answers to two decimal places.)
 $(\boxed{}, \boxed{})$

For each of the following situations, give the degrees of freedom for the group (DFG), for error (DFE), and for the total (DFT). State the null and alternative hypotheses, H_0 and H_a , and give the numerator and denominator degrees of freedom for the F statistic.

(a) A poultry farmer is interested in reducing the cholesterol level in his marketable eggs. He wants to compare two different cholesterol-lowering drugs added to the hen's standard diet as well as an all-vegetarian diet. He assigns 25 of his hens to each of the three treatments.

DFG =
DFE =
DFT =

H_0 :

- ☐ All groups have the same mean cholesterol level.
- ☐ At least one group has a different mean cholesterol level.
- ☐ The all-vegetarian diet group has a lower mean cholesterol level.
- ☐ All groups have different mean cholesterol levels.
- ☐ The all-vegetarian diet group has a higher mean cholesterol level.

H_a :

- ☐ The all-vegetarian diet group has a lower mean cholesterol level.
- ☐ All groups have the same mean cholesterol level.
- ☐ All groups have different mean cholesterol levels.
- ☐ At least one group has a different mean cholesterol level.
- ☐ The all-vegetarian diet group has a higher mean cholesterol level.

numerator df
denominator df

(b) A researcher is interested in students' opinions regarding an additional annual fee to support non-income-producing varsity sports. Students were asked to rate their acceptance of this fee on a seven-point scale. She received 96 responses, of which 30 were from students who attend varsity football or basketball games only, 16 were from

students who also attend other varsity competitions, and 50 who did not attend any varsity games.

DFG =
 DFE =
 DFT =

H_0 :

☐ All groups have different mean ratings.

☐ The group of students who do not attend games has a higher mean rating.

☐ At least one group has a different mean rating.

☐ The group of students who do not attend games has a lower mean rating.

☐ All groups have the same mean rating.

H_a :

☐ All groups have different mean ratings.

☐ The group of students who do not attend games has a higher mean rating.

☐ At least one group has a different mean rating.

☐ All groups have the same mean rating.

☐ The group of students who do not attend games has a lower mean rating.

numerator df
 denominator df

(c) A professor wants to evaluate the effectiveness of his teaching assistants. In one class period, the 45 students were randomly divided into three equal-sized groups, and each group was taught power calculations from one of the assistants. At the beginning of the next class, each student took a quiz on power calculations, and these scores were compared.

DFG =
 DFE =
 DFT =

H_0 :

☐ All groups have the same mean quiz score.

- ☐ All groups have different mean quiz scores.
- ☐ At least one group has a different mean quiz score.
- ☐ The group taught by the oldest TA has a lower mean quiz score.
- ☐ The group taught by the oldest TA has a higher mean quiz score.

H_a :

- ☐ The group taught by the oldest TA has a lower mean quiz score.
- ☐ The group taught by the oldest TA has a higher mean quiz score.
- ☐ All groups have different mean quiz scores.
- ☐ At least one group has a different mean quiz score.
- ☐ All groups have the same mean quiz score.

numerator df

denominator df

Many studies have suggested that there is a link between exercise and healthy bones. Exercise stresses the bones and this causes them to get stronger. One study examined the effect of jumping on the bone density of growing rats. There were three treatments: a control with no jumping, a low-jump condition (the jump height was 30 centimeters), and a high-jump condition (60 centimeters). After 8 weeks of 10 jumps per day, 5 days per week, the bone density of the rats (expressed in mg/cm^3) was measured. Here are the data. [data258.dat](#)

(a) Make a table giving the sample size, mean, and standard deviation for each group of rats. Consider whether or not it is reasonable to pool the variances. (Round your answers for $\bar{x}$, s , and s_{xx} to one decimal place.)

Group	n	$\bar{x}$	s	s_{xx}
High jump				
Low jump				
Control				

(b) Run the analysis of variance. Report the F statistic with its degrees of freedom and P -value. What do you conclude? (Round your test statistic to two decimal places and your P -value to three decimal places.)

$F =$

$P =$

Conclusion: There is statistically significant difference between the three treatment means at the $\alpha = .05$ level.

A survey looked at the value of recreational sports on college campuses. One of the questions asked each student to rate the importance of recreational sports to college satisfaction and success. Responses were on a 10-point scale with 1 indicating total lack of importance and 10 indicating very high importance. The following table summarizes these results:

Class	n	Mean score
Freshman	723	7.6
Sophomore	535	7.6
Junior	591	7.5
Senior	436	7.3

(a) To compare the mean scores across classes, what are the degrees of freedom for the ANOVA F statistic?

numerator df	
denominator df	

(b) The MSG = 11.906. If $s_p = 2.14$, what is the F statistic? (Round your answer to two decimal places.)

$F =$

(c) Give an approximate (from [Table E](#)) or exact (from software) P -value. (Enter your answer to four decimal places.)

For each of the following situations, identify the response variable and the populations to be compared, and give I , the n_i , and N .

(a) A poultry farmer is interested in reducing the cholesterol level in his marketable eggs. He wants to compare two different cholesterol-lowering drugs added to the hen's standard diet as well as an all-vegetarian diet. He assigns 35 of his hens to each of the three treatments.

Response variable:

- ☐ caloric intake
- ☐ number of hens
- ☐ number of marketable eggs laid
- ☐ egg cholesterol level
- ☐ diet cholesterol level

Populations: (Select all that apply.)

- ☐ hens on an all-vegetarian diet
- ☐ eggs with different cholesterol levels
- ☐ hens on a standard diet and receiving one of two cholesterol-lowering drugs
- ☐ all hens on a farm
- ☐ all eggs laid on a farm

$I =$

$n_1 =$

$n_2 =$

$n_3 =$

$N =$

(b) A researcher is interested in students' opinions regarding an additional annual fee to support non-income-producing varsity sports. Students were asked to rate their acceptance of this fee on a five-point scale. She received 96 responses, of which 31 were from students who attend varsity football or basketball games only, 16 were from students who also attend other varsity competitions, and 49 who did not attend any varsity games.

Response variable:

- ☐ amount of annual fee paid
- ☐ number of students who attend varsity games
- ☐ varsity sport played
- ☐ number of games attended
- ☐ acceptance rating on a five-point scale

Populations: (Select all that apply.)

- ☐ students who play sports
- ☐ students who attend other varsity competitions
- ☐ students who attend varsity football or basketball games
- ☐ students who do not attend any varsity games
- ☐ students who pay an annual fee

$I =$

$n_1 =$

$n_2 =$

$n_3 =$

$N =$

(c) A professor wants to evaluate the effectiveness of his teaching assistants. In one class period, the 36 students were randomly divided into three equal-sized groups, and each group was taught power calculations from one of the assistants. At the beginning of the next class, each student took a quiz on power calculations, and these scores were compared.

Response variable:

- ☐ rating of the professor on a five-point scale
- ☐ rating of the assistant on a five-point scale
- ☐ number of questions on the quiz
- ☐ course grade

☐ quiz score

Populations: (Select all that apply.)

- ☐ the three teaching assistants
- ☐ students in the three TA groups
- ☐ all students at the school
- ☐ students who like their TA
- ☐ students passing the course

= I

= n_1

= n_2

= n_3

= N

For each of the following situations, give the degrees of freedom for the group (DFG), for error (DFE), and for the total (DFT). State the null and alternative hypotheses, H_0 and H_a , and give the numerator and denominator degrees of freedom for the F statistic.

(a) A poultry farmer is interested in reducing the cholesterol level in his marketable eggs. He wants to compare two different cholesterol-lowering drugs added to the hen's standard diet as well as an all-vegetarian diet. He assigns 15 of his hens to each of the three treatments.

DFG =
DFE =
DFT =

- H_0 :
- ☐ The all-vegetarian diet group has a lower mean cholesterol level.
 - ☐ At least one group has a different mean cholesterol level.
 - ☐ The all-vegetarian diet group has a higher mean cholesterol level.
 - ☐ All groups have the same mean cholesterol level.
 - ☐ All groups have different mean cholesterol levels.

- H_a :
- ☐ The all-vegetarian diet group has a lower mean cholesterol level.
 - ☐ The all-vegetarian diet group has a higher mean cholesterol level.
 - ☐ All groups have the same mean cholesterol level.
 - ☐ At least one group has a different mean cholesterol level.
 - ☐ All groups have different mean cholesterol levels.

numerator df
denominator df

(b) A researcher is interested in students' opinions regarding an additional annual fee to support non-income-producing varsity sports. Students were asked to rate their acceptance of this fee on a seven-point scale. She received 96 responses, of which 31 were from students who attend varsity football or basketball games only, 16 were from students who also attend other varsity competitions, and 49 who did not attend any varsity games.

DFG =
DFE =
DFT =

- H_0 :
- ☐ All groups have different mean ratings.
 - ☐ At least one group has a different mean rating.
 - ☐ The group of students who do not attend games has a higher mean rating.
 - ☐ The group of students who do not attend games has a lower mean rating.
 - ☐ All groups have the same mean rating.

- H_a :
- ☐ All groups have different mean ratings.
 - ☐ All groups have the same mean rating.
 - ☐ The group of students who do not attend games has a lower mean rating.
 - ☐ At least one group has a different mean rating.
 - ☐ The group of students who do not attend games has a higher mean rating.

numerator df
denominator df

(c) A professor wants to evaluate the effectiveness of his teaching assistants. In one class period, the 45 students were randomly divided into three equal-sized groups, and each group was taught power calculations from one of the assistants. At the beginning of the next class, each student took a quiz on power calculations, and these scores were compared.

DFG =
DFE =
DFT =

3. -/0.64 points
Ministror 12.E.065.

Many studies have suggested that there is a link between exercise and healthy bones. Exercise stresses the bones and this causes them to get stronger. One study examined the effect of jumping on the bone density of growing rats. There were three treatments: a control with no jumping, a low-jump condition (the jump height was 30 centimeters), and a high-jump condition (60 centimeters). After 8 weeks of 10 jumps per day, 5 days per week, the bone density of the rats (expressed in mg/cm^3) was measured. Here are the data. [data159.dat](#)

(a) Make a table giving the sample size, mean, and standard deviation for each group of rats. Consider whether or not it is reasonable to pool the

variances. (Round your answers for $\bar{x}$, s , and $s(\sqrt{xx})$ to one decimal place.)

Group	$\bar{x}$	s	$s(\sqrt{xx})$
Control			
Low jump			
High jump			

(b) Run the analysis of variance. Report the F statistic with its degrees of freedom and P -value. What do you conclude? (Round your test statistic to two decimal places and your P -value to three decimal places.)

$F =$
 $P =$

Conclusion: There is statistically significant difference between the three treatment means at the $\alpha = .05$ level.

4. -/0.64 points
Ministror 12.E.516.XP.

A study of reading comprehension in children compared three methods of instruction. The three methods of instruction are called Basal, DRTA, and Strategies. As is common in such studies, several pretest variables were measured before any instruction was given. One purpose of the pretest was to see if the three groups of children were similar in their comprehension skills. The [READING](#) data set described in the Data Appendix gives two pretest measures that were used in this study. Use one-way ANOVA to analyze these data and write a summary of your results.

This answer has not been graded yet.

A study of reading comprehension in children compared three methods of instruction. The three methods of instruction are called Basal, DRTA, and Strategies. Basal is the traditional method of teaching, while DRTA and Strategies are two innovative methods based on similar theoretical considerations. The [READING](#) data set includes three response variables that the new methods were designed to improve. Analyze these variables using ANOVA methods. Be sure to include multiple comparisons or contrasts as needed. Write a report summarizing your findings.

This answer has not been graded yet.

6. -/0.6399999999999999 points

The *One-Way ANOVA* [applet](#) lets you see how the F statistic and the P -value depend on the variability of the data within groups, the sample size, and the differences. The black dots are at the means of the three groups. Move these up and down until you get a configuration that gives a P -value of about 0.01. What is the value

This answer has not been graded yet.

(b) Now increase the variation within the groups by sliding the standard deviation bar to the right. Describe what happens to the F statistic and the P -value.

This answer has not been graded yet.

(c) Using between- and within-group variation, explain why the F statistic and P -value change in this way.

This answer has not been graded yet.

7. -/0.64 points

Corporate advertising tries to enhance the image of the corporation. A study compared two ads from two sources, the *Wall Street Journal* and the *National Enquirer*. Subjects were asked to pretend that their company was considering a major investment in Performax, the fictitious sportswear firm in the ads. Each subject was asked to respond to the question "How trustworthy was the source in the sportswear company ad for Performax?" on a 7-point scale. Higher values indicated more trustworthiness. Here is a summary of the results.

Ad source	n	$\bar{x}$	s
Wall Street Journal	66	4.77	1.50
National Enquirer	61	2.43	1.64

Find the two-sample pooled t statistic. Then formulate the problem as an ANOVA and report the results of this analysis. Verify that $F = t^2$.

This answer has not been graded yet.

A survey looked at the value of recreational sports on college campuses. One of the questions asked each student to rate the importance of recreational sports to college satisfaction and success. Responses were on a 10-point scale with 1 indicating total lack of importance and 10 indicating very high importance. The following table summarizes these results:

Class	n	Mean score
Freshman	720	7.6
Sophomore	535	7.6
Junior	593	7.5
Senior	437	7.3

(a) To compare the mean scores across classes, what are the degrees of freedom for the ANOVA F statistic?

numerator df	
denominator df	

(b) The MSG = 11.906. If $s_p = 2.13$, what is the F statistic? (Round your answer to two decimal places.)

$F =$

(c) Give an approximate (from Table E) or exact (from software) P -value. (Enter your answer to four decimal places.)

Different varieties of the tropical flower *Heliconia* are fertilized by different species of hummingbirds. Over time, the lengths of the flowers and the form of the hummingbirds' beaks have evolved to match each other. Here are data on the lengths in millimeters of three varieties of these flowers on the island of Dominica. [data364.dat](#)

Do a complete analysis that includes description of the data and a significance test to compare the mean lengths of the flowers for the three species. (Round your answers for $\bar{x}$ to four decimal places, s to three decimal places, and s_p to three decimal places.)

flower type	n	$\bar{x}$ (mm)	s (mm)
<i>H. bina</i>			
<i>H. caribaea</i> red			
<i>H. caribaea</i> yellow			

$F =$

$P =$

Iron-deficiency anemia is the most common form of malnutrition in developing countries, affecting about 50% of children and women and 25% of men. Iron pots for cooking foods had traditionally been used in many of these countries, but they have been largely replaced by aluminum pots, which are cheaper and lighter. Some research has suggested that food cooked in iron pots will contain more iron than food cooked in aluminum, clay, and iron pots. One of the foods was *yesiga wet*, beef cut into small pieces and prepared with several Ethiopian spices. The iron content of four samples of *yesiga wet* cooked in each of the three types of pots is given below. The units are milligrams of iron per 100 grams of cooked food. [data158.dat](#)

(a) Make a table giving the sample size, mean, and standard deviation for each type of pot. Is it reasonable to pool the variances? Note that with the small sample sizes in this experiment, we expect a large amount of variability in the sample standard deviations.

Type of pot	n	$\bar{x}$ (mg)	s (mg)
Aluminum			
Clay			
Iron			

(b) Run the analysis of variance. Report the F statistic with its degrees of freedom and P -value. What do you conclude? (Round your test statistic to two decimal places. Round your P -value to three decimal places.)

$F =$

$P =$

Conclusion: There is statistically significant difference between the three treatment means at the $\alpha = .05$ level.

The National Crime Victimization Survey estimates that there were over 400,000 violent crimes committed against women by their intimate partner that resulted in physical injury. An intervention study designed to increase safety behaviors of abused women compared the effectiveness of six telephone intervention sessions with a control group of abused women who received standard care. Fifteen different safety behaviors were examined. One of the variables analyzed was the total number of behaviors (out of 15) that each woman performed. Here is a summary of the means of this variable at baseline (just before the first telephone call) and at follow-up 3 and 6 months later.

Time		Group		
		Baseline	3 months	6 months
Intervention		10.4	12.5	11.9
Control		9.6	9.9	10.4

(a) Find the marginal means. (Round your answers to three decimal places.)

Time		Group		
		Baseline	3 months	6 months
Intervention		10.4	12.5	11.9
Control		9.6	9.9	10.4
Mean				

- Are they useful for understanding the results of this study?
- ☐ The row means suggest that the intervention group showed more improvement than the control group.
 - ☐ The row means suggest that the control group showed more improvement than the 3 months group.
 - ☐ The row means suggest that the control group showed more improvement than the baseline group.
 - ☐ The row means suggest that the intervention group showed less improvement than the control group.
 - ☐ The row means suggest that the intervention group showed more improvement than the 6 months group.

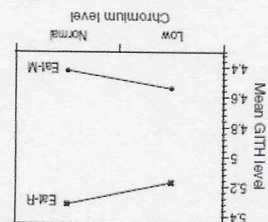
- (b) Plot the means. Do you think there is an interaction? Describe the meaning of an interaction for this study.
- ☐ Yes there is an interaction, it means that the mean number of actions does not change over time for the two groups.
 - ☐ Yes there is an interaction, it means that the mean number of actions changes differently over time for the two groups.
 - ☐ Yes there is an interaction, it means that the mean number of actions changes consistently over time for the two groups.
 - ☐ No there is not an interaction, meaning that the mean number of actions does not change over time for the two groups.

(Note: This exercise is from a repeated-measures design, and the data are not particularly normal because they are counts with values from 1 to 10. Although we cannot use the methods in this chapter for statistical inference in this setting, the example does illustrate ideas about interactions.)

The amount of chromium in the diet has an effect on the way the body processes insulin. In an experiment designed to study this phenomenon, four diets were fed to male rats. There were two factors. Chromium had two levels: low (L) and normal (N). The rats were allowed to eat as much as they wanted (M) or the total amount that they could eat was restricted (R). We call the second factor Eat. One of the variables measured was the amount of an enzyme called GITH. The means for this response variable appear in the following table.

Chromium	Eat		
		M	R
L	Low	4.545	5.175
		4.425	5.317

A plot of the mean GITH for these diets, with the factor Chromium on the x axis and GITH on the y axis is given below. For each Eat group the points for the two Chromium means are connected.



(a) Describe the patterns you see. Does the amount of chromium in the diet appear to affect the GITH mean? Does restricting the diet rather than letting the rats eat as much as they want appear to have an effect? Is there an interaction?

This answer has not been graded yet.

(b) Compute the marginal means. Compute the differences between the M and R diets for each level of Chromium. Use this information to summarize numerically the patterns in the plot.

This answer has not been graded yet.

Iron-deficiency anemia is the most common form of malnutrition in developing countries, affecting about 50% of children and women and 25% of men. Iron pots for cooking foods had traditionally been used in many of these countries, but they have been largely replaced by aluminum pots, which are cheaper and lighter. Some research has suggested that food cooked in iron pots will contain more iron than food cooked in other types of pots. One study designed to investigate this issue compared the iron content of some Ethiopian foods cooked in aluminum, clay, and iron pots. Foods considered were *yesiga wet*, beef cut into small pieces and prepared with several Ethiopian spices; *shiro wet*, a legume-based mixture of chickpea flour and Ethiopian spiced pepper; and *ye-attikilt allych'a*, a lightly spiced vegetable casserole. Four samples of each food were cooked in each type of pot. The iron in the food is measured in milligrams of iron per 100 grams of cooked food. The data are shown in the table below.

Iron Content (mg/100 g) of Food Cooked in Different Pots												
Type of pot	Meat			Legumes			Vegetables					
Aluminum	1.77	2.36	1.96	2.14	2.40	2.17	2.41	2.34	1.03	1.53	1.07	1.30
Clay	2.27	1.28	2.48	2.68	2.41	2.43	2.57	2.48	1.55	0.79	1.68	1.82
Iron	5.27	5.17	4.06	4.22	3.69	3.43	3.84	3.72	2.45	2.99	2.80	2.92

(a) Make a table giving the sample size, mean, and standard deviation for each type of pot. Is it reasonable to pool the variances? Although the standard deviations vary more than we would like, this is partially due to the small sample sizes, and we will proceed with the analysis of variance.

This answer has not been graded yet.

(b) Plot the means. Give a short summary of how the iron content of foods depends upon the cooking pot.

This answer has not been graded yet.

(c) Run the analysis of variance. Give the ANOVA table, the F statistics with degrees of freedom and P -values, and your conclusions regarding the hypotheses about main effects and interactions.

This answer has not been graded yet.

Do left-handed people live shorter lives than right-handed people? A study of this question examined a sample of 949 death records and contacted next of kin to determine handedness. Note that there are many possible definitions of "left-handed." The researchers examined the effects of different definitions on the results of their analysis and found that their conclusions were not sensitive to the exact definition used. For the results presented here, people were defined to be right-handed if they wrote, drew, and threw a ball with the right hand. All others were defined to be left-handed. People were classified by sex (female or male) and handedness (left or right), and a 2×2 ANOVA was run with the age at death as the response variable. The F statistics were 22.36 (handedness), 37.44 (sex), and 66.03 (interaction). The following marginal mean ages at death (in years) were reported: 77.39 (females), 71.32 (males), 75.00 (right-handed), and 66.03 (left-handed).

(a) For each of the F statistics given, find the degrees of freedom and an approximate P -value. Summarize the results of these tests.

This answer has not been graded yet.

(b) Using the information given, write a short summary of the results of the study.

This answer has not been graded yet.

A study of undergraduate computer science students examined changes in major after the first year. The study examined the fates of 256 students who enrolled as first-year students in the same fall semester. The students were classified according to gender and their declared major at the beginning of the second year. For convenience we use the labels CS for computer science majors, EO for engineering and other science majors, and O for other majors. The explanatory variables included several high school grade summaries coded as 10 = A, 9 = A-, etc. Here are the mean high school mathematics grades for these students.

Major			
Gender	CS	EO	O
Males	8.68	8.35	7.65
Females	9.11	9.36	8.04

Describe the main effects and interaction using appropriate graphs and calculations.

This answer has not been graded yet.

A study of undergraduate computer science students examined changes in major after the first year. The study examined the fates of 256 students who enrolled as first-year students in the same fall semester. The students were classified according to gender and their declared major at the beginning of the second year. For convenience we use the labels CS for computer science majors, EO for engineering and other science majors, and O for other majors. The mean SAT mathematics scores for the students are summarized in the following table.

Major			
Gender	CS	EO	O
Males	628	618	589
Females	582	631	543

Summarize the results of this study using appropriate plots and calculations to describe the main effects and interaction.

This answer has not been graded yet.

A study of undergraduate computer science students examined changes in major after the first year. The study examined the fates of 256 students who enrolled as first-year students in the same fall semester. The students were classified according to gender and their declared major at the beginning of the second year. The students studied were enrolled at a large Midwestern university several years ago. Discuss how you would conduct a similar study at a college or university of your choice today. Include a description of all variables that you would collect for your study.

This answer has not been graded yet.