

A Second Course in Statistics Regression Analysis

8th Edition Solution Manual

Chapter

1

A Review of Basic Concepts (Optional)

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- 1.1
- High school GPA is a number usually between 0.0 and 4.0. Therefore, it is quantitative.
 - Country of citizenship: USA, Japan, etc. is qualitative.
 - The scores on the SAT's are numbers between 200 and 800. Therefore, it is quantitative.
 - Gender is either male or female. Therefore, it is qualitative.
 - Parent's income is a number: \$25,000, \$45,000, etc. Therefore, it is quantitative.
 - Age is a number: 17, 18, etc. Therefore, it is quantitative.
- 1.2
- The experimental units are the new automobiles. The model name, manufacturer, type of transmission, engine size, number of cylinders, estimated city miles/gallon, and estimated highway miles/gallon are measured on each automobile.
 - Model name, manufacturer, and type of transmission are qualitative. None of these is measured on a numerical scale. Engine size, number of cylinders, estimated city miles/gallon, and estimated highway miles/gallon are all quantitative. Each of these variables is measured on a numerical scale.
- 1.3
- Both the variables current position and type of organization are qualitative. The variable years of experience is quantitative because it is measured on a numerical scale.
- 1.4
- The experimental units are the operational satellites currently in orbit around Earth. The variables country of operator/owner, primary use, and class of orbit are all qualitative because none are measured on a numerical scale. The variables longitudinal position, apogee, launch mass, usable electric power, and expected lifetime are all quantitative variables. All of these variables are measured on a numerical scale.
- 1.5
- Species of sea buckthorn is a qualitative variable.
 - Altitude of collection location is a quantitative variable.
 - Total flavonoid content in berries is a quantitative variable.
- 1.6
- Gender and level of education are both qualitative since neither is measured on a numerical scale. Age, income, job satisfaction score, and Machiavellian rating score are all quantitative since they can be measured on a numerical scale.
- 1.7
- The population of interest is all decision makers. The sample set is 155 volunteer students. Variables measured were the emotional state and whether to repair a very old car (yes or no).

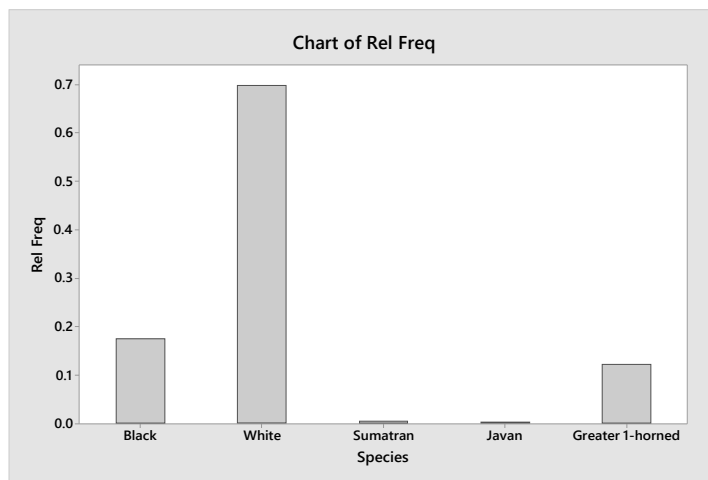
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- b. Subjects in the guilty-state group are less likely to repair an old car.
-
- 1.8
 - a. The data would represent the population. These data are all of the data that are of interest to the researchers.
 - b. If the 80 jamming attacks are actually a sample, then the population would be all jamming attacks by the U.S. military over the past several years.
-
- 1.9
 - a. The experimental units are the participants in the study.
 - b. The variables of interest are the price of the engagement ring and the level of appreciation. The price of the ring is quantitative, while the level of appreciation is qualitative.
 - c. The population of interest is average American engaged couples.
 - d. The sample of 33 respondents is probably not representative of the population. Only engaged couples who used a popular website for engaged couples were used. Those who used this website were probably not representative of all average American engaged couples.
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- 1.10
 - a. The sample is the set of 505 teenagers selected at random from all U.S. teenagers.
 - b. The population from which the sample was selected is the set of all teenagers in the U.S.
 - c. Since the sample was a random sample, it should be representative of the population.
 - d. The variable of interest is the topics that teenagers most want to discuss with their parents.
 - e. The inference is expressed as a percent of the population that want to discuss particular topics with their parents.
 - f. The “margin of error” is the measure of reliability. This margin of error measures the uncertainty of the inference.
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- 1.11
 - a. The population of interest is all young women who recently participated in a STEM program.
 - b. The sample is the 159 young women who were recruited to complete an online survey.
 - c. We would infer that 27% of all young women who recently participated in a STEM program felt that participation in the STEM program increased their interest in science.
-
- 1.12
 - a. The population of interest is the Machiavellian traits in accountants.
 - b. The sample is 198 accounting alumni of a large southwestern university.
 - c. The Machiavellian behavior is not necessary to achieve success in the accounting profession.
 - d. Non-response could bias the results by not including potential other important information that could direct the researcher to a conclusion.

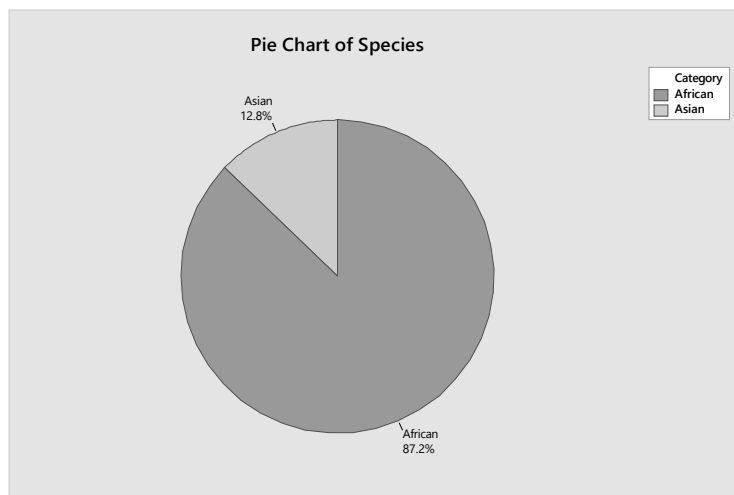
- 1.13 a. A relative frequency table is:

Rhino Species	Frequency	Relative Frequency
African Black	5,000	0.1745
African White	20,000	0.6978
(Asian) Sumatran	100	0.0035
(Asian) Javan	60	0.0021
(Asian) Greater One-Horned	3,500	0.1221
Total	28,660	1.000

- b. Using MINITAB, the relative frequency bar graph is:

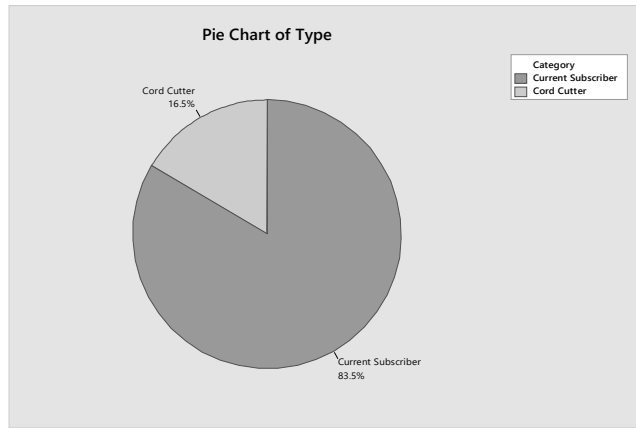


- c. The proportion of African rhinos is $0.1745 + 0.6978 = 0.8723$. The proportion of Asian rhinos is $0.0035 + 0.0021 + 0.1221 = 0.1277$.
- d. Using MINITAB, the pie chart for these proportions is:

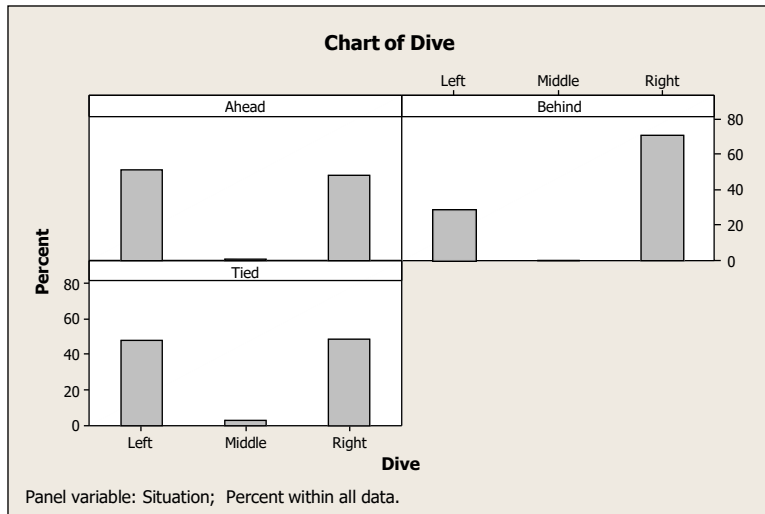


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- 1.14 a. From the pie chart, 76.0% of the sample have a cable/satellite subscription at home. The proportion would be 0.76. This can be found by computing the relative frequency or $1,521 / 2,001 = 0.76$.
- b. Using MINITAB, the pie chart is:



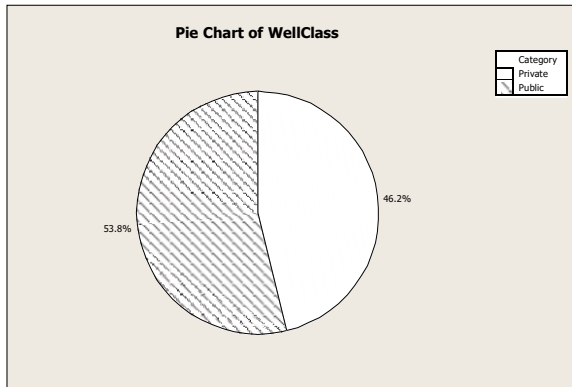
- 1.15 Using MINITAB, the side-by-side bar graphs are:



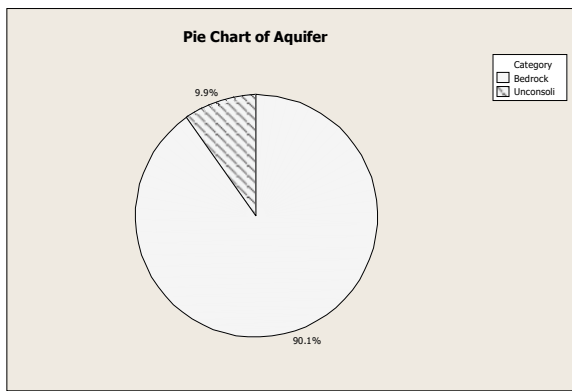
From the graphs, it appears that if the team is either tied or ahead, the goal-keepers tend to dive either right or left with equal probability, with very few diving in the middle. However, if the team is behind, then the majority of goal-keepers tend to dive right (71%).

- 1.16 a. $\frac{196}{504} = 0.3889$ is the proportion of ice melt ponds that had landfast ice.
- b. Yes, since $\frac{88}{504} = 0.1746$ is approximately 17%.
- c. The multiyear ice type appears to be significantly different from the first-year ice melt.

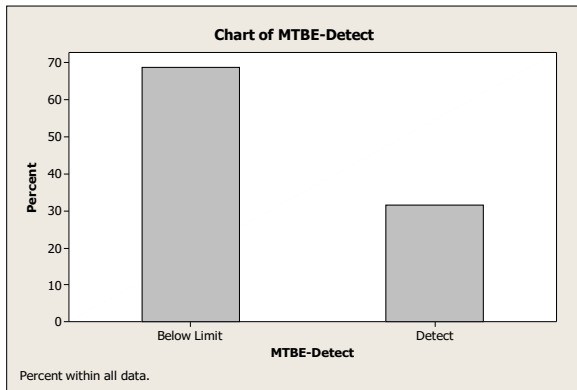
1.17 a.



b.

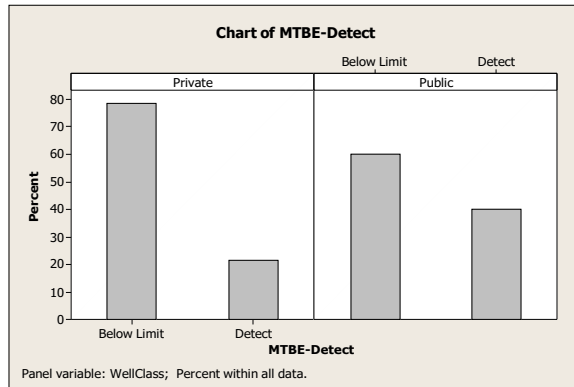


c.



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d.

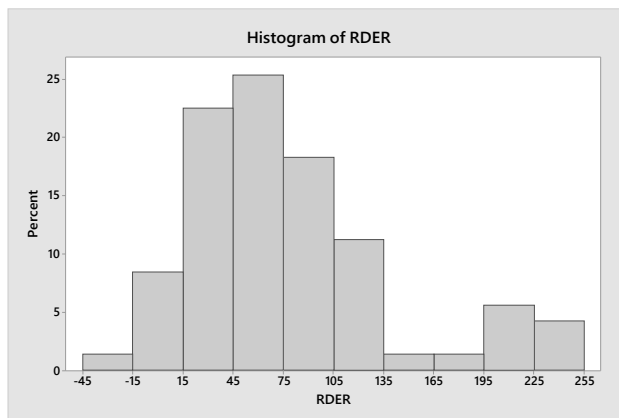


Public wells (40%); Private wells (21%).

- 1.18 a. The estimated percentage of aftershocks measuring between 1.5 and 2.5 on the Richter scale is approximately 68%.
 b. The estimated percentage of aftershocks measuring greater than 3.0 on the Richter scale is approximately 12%.
 c. The data are skewed right.

- 1.19 a. The graph is a frequency histogram.
 b. The quantitative variable summarized in the graph is the fup/fumic ratio.
 c. The proportion of ratios greater than 1 is $\frac{8+5+1}{416} = \frac{14}{416} = 0.034$.
 d. The proportion of ratios less than 0.4 is $\frac{181+108}{416} = \frac{289}{416} = .695$.

- 1.20 a. Using MINITAB, the frequency histogram is:



- b. From the graph, it appears that about 0.18 of the RDER values are between 75 and 105.

c. From the graph, it appears that about 0.10 of the RDER values are below 15.

1.21 The tem-and-leaf display with the leaves for the honey dosage group bolded.

Stem-and-leaf of TotalScore N = 105

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1  0  0
4  1  000
4  2
7  3  000
16 4  00000000
20 5  0000
28 6  00000000
41 7  000000000000
52 8  0000000000
(13) 9  000000000000
40 10 0000000000
30 11 000000
24 12 000000000000
11 13 0000
7  14 0
6  15 00000
1  16 0
Leaf Unit = 0.1
    
```

Yes. Most of the scores for the honey dosage tend to be higher than the other treatments.

1.22 a. Using MINITAB, the frequency histogram is:

