Methods for Describing Set of Data

Chapter **2**

2.1 The class frequency is the number of observations in the data set falling in a particular class. The class relative frequency is the class frequency divided by the total number of observations in the data set. The class percentage is the class relative frequency multiplied by 100.

2.3 In a bar graph, a bar or rectangle is drawn above each class of the qualitative variable corresponding to the class frequency or class relative frequency. In a Pareto diagram, the bars of the bar graph are arranged in order from the largest to the smallest from left to right.

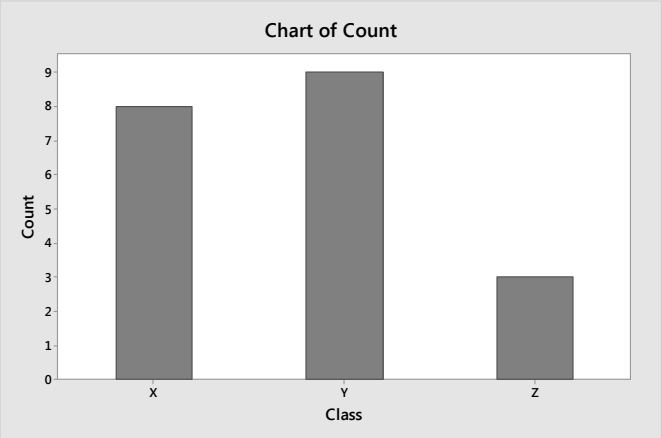
2.5 a. To find the frequency for each class, count the number of times each letter occurs. The frequencies for the three classes are:

Class	Frequency
X	8
Y	9
Z	3
Total	20

b. The relative frequency for each class is found by dividing the frequency by the total sample size. The relative frequency for the class X is 8/20 = .40. The relative frequency for the class Y is 9/20 = .45. The relative frequency for the class Z is 3/20 = .15.

Class	Frequency	Relative Frequency
X	8	.40
Y	9	.45
Z	3	.15
Total	20	1.00

c. The frequency bar chart is:

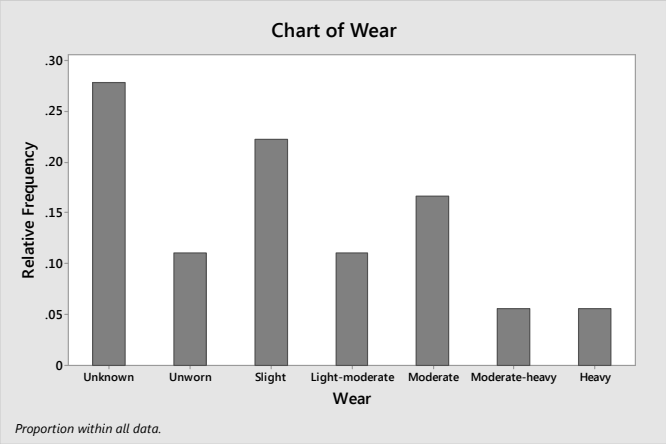


b. The number of cheek teeth in each wear category is:

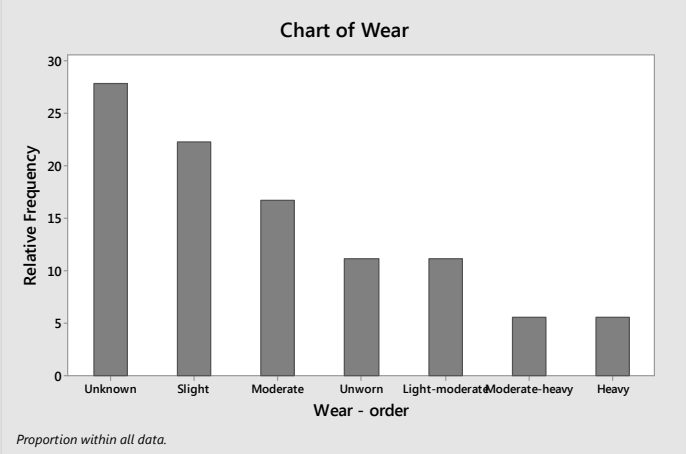
Degree of Wear	Frequency	Relative Frequency
Unknown	5	5/18 = 0.278
Unworn	2	2/18 = 0.111
Slight	4	4/18 = 0.222
Light-moderate	2	2/18 = 0.111
Moderate	3	3/18 = 0.167
Moderate-heavy	1	1/18 = 0.056
Heavy	1	1/18 = 0.056
Total	**18**	**18/18 = 1**

c. To compute the relative frequency, you divide the frequency by the total number of observations. For this example, the total number of observations is 18. The relative frequency for 'Unknown' is 5/18 = .278. The rest of the calculations are done in a similar manner and appear in the table in part b.

d. Using MINITAB, a relative frequency bar graph is:



e. A Pareto diagram is a bar graph with the categories arranged in order from the largest to the smallest from left to right. The Pareto diagram for this data is:

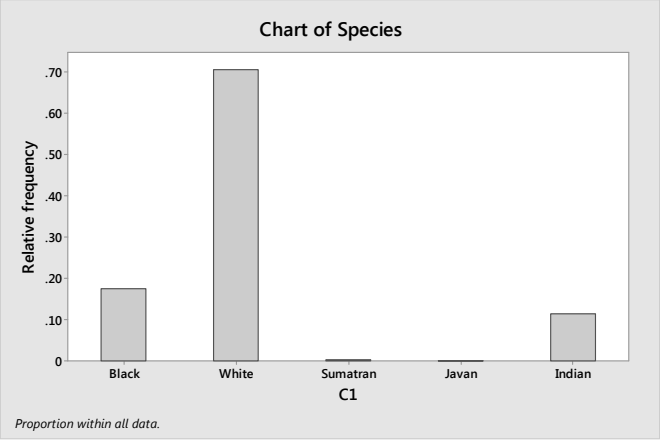


f. The degree of wear category that occurred most often is 'Unknown'.

2.11 a. To construct a relative frequency table for data, we must find the relative frequency for each species of rhinos. To find the relative frequency, divide the frequency by the total population size, 17,800. The relative frequency for African Black rhinos is 3,610/17,800 = 0.203. The rest of the relative frequencies are found in a similar manner and are reported in the table.

Rhino species	**Population Estimate**	**Relative Frequency**
African Black	5,055	5055 / 28933 = 0.175
African White	20,405	20405 / 28933 = 0.705
(Asian) Sumatran	100	100 / 28933 = 0.003
(Asian) Javan	40	40 / 28933 = 0.001
(Asian) Indian	3,333	3333 / 28933 = 0.115
Total	**28,933**	**0.999**

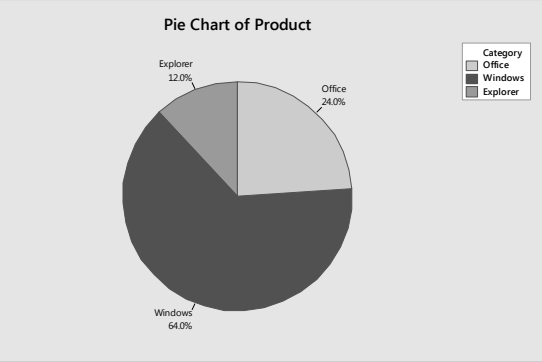
b. Using MINITAB, the relative frequency bar chart is:



c. The proportion of rhinos that are African is $(5,055 + 20,405) / 28,933 = 0.880$.

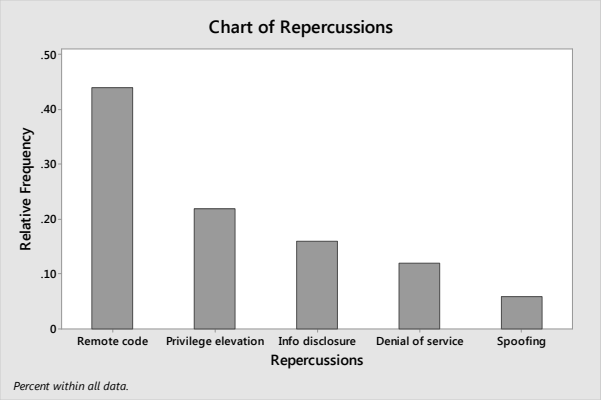
The proportion of rhinos that are Asian is $(100 + 40 + 3,333) / 28,933 = 0.120$.

2.13 a. Using MINITAB, the pie chart is:



Explorer had the lowest proportion of security issues in 2012.

b. Using MINITAB, the Pareto diagram is:

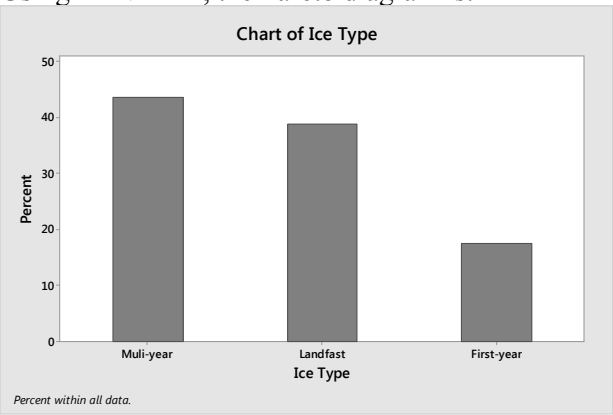


We would advise Microsoft to focus on remote code since it has the highest relative frequency.

2.15 a. From the summary table, the proportion of melt ponds that had landfast ice is 38.89 / 100 = 0.3889.

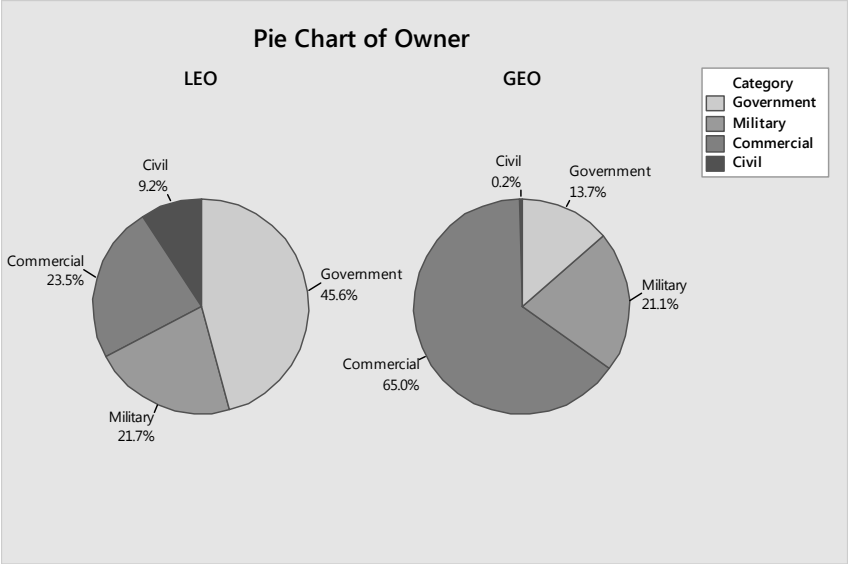
b. Yes. From the summary table 17.46% of the melt ponds had first-year ice.

c. Using MINITAB, the Pareto diagram is:



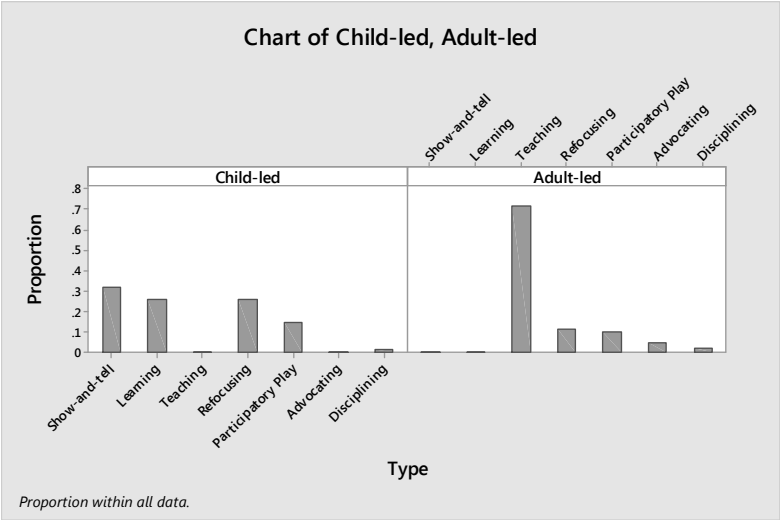
The most commonly found type of ice is multi-year ice, followed by landfast ice. The least frequently found type of ice is first-year ice.

2.17 Using MINITAB, pie charts for the two sets of data are:



In the LEO, most of the satellites are owned by the government (45.6%), while in GEO, most of the satellites are commercially owned (5.0%). About the same percentage of both LEO and GEO satellites are owned by the military (21.7% and 21.1% respectively). About 9% of the LEO satellites are civil, while only 0.2% of the GEO satellites are civil.

2.19 Using MINITAB, the side-by-side bar charts are:



The four main categories for child-led interactions are show-and-tell, learning, refocusing, and participatory play. Adults had only one main category which was teaching.