DESCRIPTIVE STATISTICS WORKSHEET
MTH 3210 SPRING 2016

Before you work on the problems (Section 3) please make sure that you read the supplementary notes (Section 1) and work through the practice problems (Section 2). Solutions to the practice problems are posted in the appendix (Section A). **It is important that you understand how to work through these problems before Exam 1.**

1. TYPES OF DATA

Descriptive statistics involves the organization and description of data sets using tables, charts and key numbers calculated from the data set. Descriptive statistics can be done for both sample data and population data, although some definitions (like the standard deviation) depend on whether you are dealing with sample data or population data. It is important to classify the data you are describing, because different types of data require different descriptive statistics:

- **Categorical or Qualitative Data** - Categorical data is non-numerical data (for example, eye color of each Metro State student). We use pie charts and bar charts to graph distributions of categorical data.
- **Discrete Data** - Discrete data is numerical data whose possible values can be counted (for example, the number of siblings of each Metro State student). We use histograms with midpoint labels to graph discrete data.
- **Continuous Data** - Continuous data is numerical data that can take any value in a continuous range of numbers (for example, the height in mm of a Metro State student). We use histograms with cut points to describe continuous data.

This worksheet requires you to clearly organize and compute detailed information about three data sets. Each of the three 'quiz' problems features a different type of data and requires that you graph and calculate several descriptive measures of the data set using a variety of methods. For explanations and definitions of special terms and concepts, please refer to our textbook.

2. PRACTICE PROBLEMS

2.1. Practice Problem (Categorical Data). The class levels of a simple random sample of students are as follow. The abbreviations F, So, J, Se stand for Freshman, Sophmore, Junior and Senior, respectively.

$$\{ \ Se \ , \ Se \ , \ Se \ , \ F \ , \ J \ , \ Se \ , \ Se \ , \ So \ , \ J \ , \ J \ , \ Se \ ,$$
$$Se \ , \ F \ , \ Se \ , \ Se \ , \ Se \ , \ So \ , \ So \ , \ So \ , \ So \ , \ Se \ , \ Se \ \}$$

(1) Construct a table that gives the frequency distribution of this data.

(2) Construct a table that gives the relative frequency distribution of this data.
(3) Construct a pie chart of this data that displays the percentage of students at each class level.
(4) Construct a bar graph of this data that displays the frequency of students at each class level.
(5) Construct a bar graph of this data that displays the relative frequency of students at each class level.

2.2. **Practice Problem (Discrete Data).** A sample of clutch sizes (number of eggs produced) for a certain type of duck is given as follows:

$$\{ \ 13 \ , 11 \ , 9 \ , 8 \ , 11 \ , 7 \ , 9 \ , 9 \ , 10 \ , 6$$
$$11 \ , 10 \ , 10 \ , 10 \ , 12 \ , 10 \ , 10 \ , 7 \ , 10 \ \}$$

(1) Construct a table that gives the frequency distribution of this data.
(2) Construct a table that gives the relative frequency distribution of this data.
(3) Construct a frequency histogram of this data.
(4) Construct a relative frequency histogram of this data.
(5) Construct a stem and leaf plot for this data set.
(6) Find the sample mean for this data set.
(7) Find the median of this data set.
(8) Find the sample standard deviation of this data set.
(9) Describe in complete sentences the distribution of this data set using vocabulary presented in the textbook.

2.3. **Practice Problem (Continuous Data).** The low temperature on February 1rst in Denver for the last 26 years is given by the table below

Year	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
2-1 Low Temp ($°F$)	30.2	30.2	13.1	12.2	25.2	34	32	29.8	3.9	39.9	-6.2

1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
44.6	23	26.6	17.6	14	15.8	48.2	17.6	19.4	23	5	28.4	32	23	-13

(1) Construct a table that gives the frequency distribution of this data.
(2) Construct a table that gives the relative frequency distribution of this data.
(3) Construct a frequency histogram of this data.
(4) Construct a relative frequency histogram of this data.
(5) Construct a stem and leaf plot for this data set.
(6) Find the sample mean for this data set.
(7) Find the median of this data set.
(8) Find the sample standard deviation of this data set.
(9) Describe in complete sentences the distribution of this data set using vocabulary presented in the textbook.

3. Additional Problems

3.0.1. *Self-quiz Problem (Categorical Data).* A sample of major networks viewed on a given night by 14 randomly selected households is given as follows.

$$\{ \ ABC \ , \ NBC \ , \ FOX \ , \ CBS \ , \ NBC \ , \ NBC \ , \ ABC \ ,$$
$$NBC \ , \ NBC \ , \ ABC \ , \ NBC \ , \ FOX \ , \ ABC \ , \ CBS \ ,\}$$

(1) Construct a table that gives the frequency distribution of this data.
(2) Construct a table that gives the relative frequency distribution of this data.
(3) Construct a pie chart of this data that displays the percentage of networks.
(4) Construct a bar graph of this data that displays the frequency of networks.
(5) Construct a bar graph of this data that displays the relative frequency of networks.

3.0.2. *Self-quiz Problem (Discrete Data).* The number of shot blocks of a certain basketball player had in 24 randomly selected games is given as follows,

$$\{ \ 1 \ , \ 2 \ , \ 2 \ , \ 2 \ , \ 2 \ , \ 1 \ , \ 3 \ , \ 4 \ , \ 2 \ , \ 1 \ , \ 3 \ , \ 1$$
$$5 \ , \ 2 \ , \ 1 \ , \ 3 \ , \ 0 \ , \ 1 \ , \ 4 \ , \ 4 \ , \ 3 \ , \ 3 \ , \ 5 \ , \ 2 \ \}$$

(1) Construct a table that gives the frequency distribution of this data.
(2) Construct a table that gives the relative frequency distribution of this data.
(3) Construct a frequency histogram of this data.
(4) Construct a relative frequency histogram of this data.
(5) Construct a stem and leaf plot for this data set.
(6) Find the sample mean for this data set.
(7) Find the median of this data set.
(8) Find the sample standard deviation of this data set.
(9) Describe in complete sentences the distribution of this data set using vocabulary presented in the textbook.

3.0.3. *Self-quiz Problem (Continuous Data).* The low temperature on February 1rst in Salt Lake City for the last 26 years is given by the table below

Year	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
2-1 Low Temp ($°F$)	35.1	25	14	28	27	12	17.1	16	16	32.9	12

1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
34.2	26.6	24.5	17.1	17.4	10	39	17.6	26.1	32	16	18	23	28	14

(1) Construct a table that gives the frequency distribution of this data.
(2) Construct a table that gives the relative frequency distribution of this data.
(3) Construct a frequency histogram of this data.

(4) Construct a relative frequency histogram of this data.
(5) Construct a stem and leaf plot for this data set.
(6) Find the sample mean for this data set.
(7) Find the median of this data set.
(8) Find the sample standard deviation of this data set.
(9) Describe in complete sentences the distribution of this data set using vocabulary presented in the textbook.

Appendix A. Solutions to Practice Problems
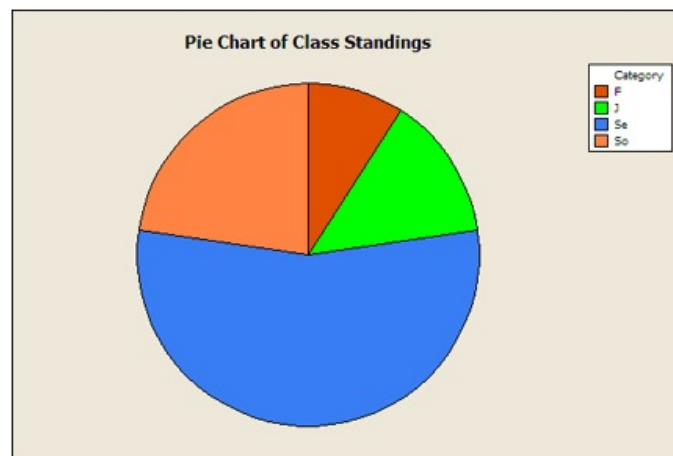
A.1. Solution to Practice Problem 3.0.1.

(1) The frequency distribution is summarized by the following table:

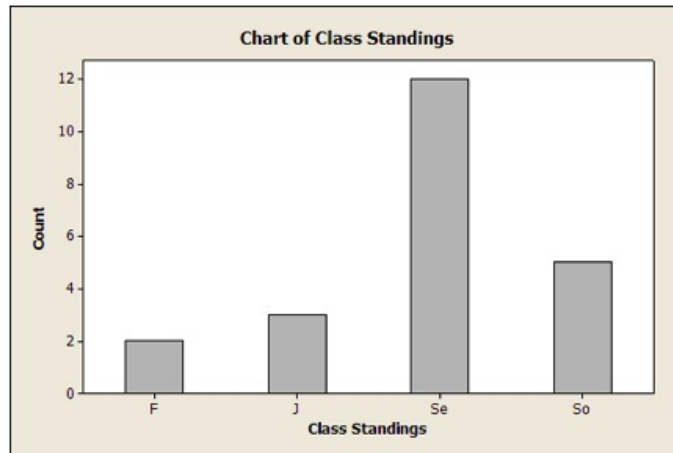| Class	Frequency
F	2
So	5
J	3
Se	12

(2) The relative frequency distribution is summarized by the following table:

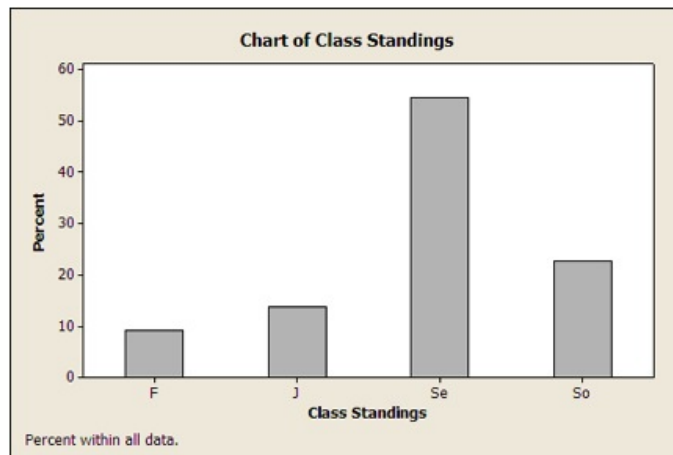| Class	Relative Frequency
F	.091
So	.227
J	.136
Se	.545

(3) The following pie chart was created using Minitab (saved as a .jpg using "Copy Graph")

(4) The following frequency distribution bar graph was created using Minitab (saved as a .jpg using "Copy Graph")

Chart of Class Standings

(5) The following relative frequency distribution bar graph was created using Minitab (saved as a .jpg using "Copy Graph")

Chart of Class Standings

Percent within all data.

A.2. Solution to Practice Problem 3.0.2.

(1) The frequency distribution is summarized by the following table:

| Clutch Size	Frequency
6	1
7	2
8	1
9	3
10	7
11	3
12	1
13	1

(2) The relative frequency distribution is summarized by the following table:

Clutch Size	Relative Frequency
6	.053
7	.105
8	.053
9	.158
10	.368
11	.158
12	.053
13	.053

(3) The following frequency histogram was created using Minitab (saved as a .jpg using "Copy Graph")
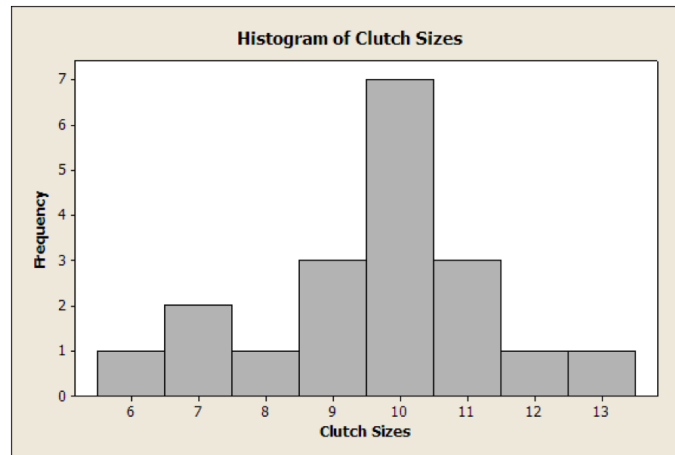
(4) The following relative frequency histogram was created using Minitab (saved as a .jpg using "Copy Graph")
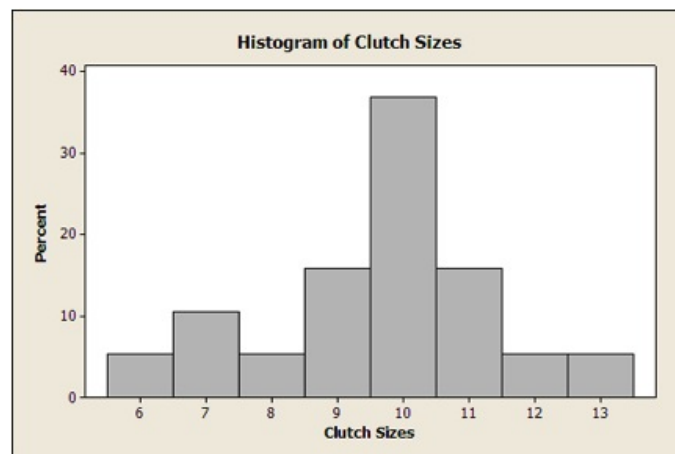
(5) The following stem and leaf plot uses enough stems to reveal the distribution of the data:

6 0

```
7   00
8   0
9   000
10  0000000
11  000
12  0
13  0
```

(6) The mean is $\bar{x} = 9.632$

(7) The median is 10.

(8) The standard deviation is $s_x = 1.739$

(9) The distribution is bell-shaped without much skew to the left or right.

A.3. **Solution to Practice Problem 3.0.3.**

(1) The frequency distribution is summarized by the following table:

| 2-1 Low Temp $(^\circ F)$	Frequency
$-15 \leq x < -7$	1
$-7 \leq x < 1$	1
$1 \leq x < 9$	2
$9 \leq x < 17$	4
$17 \leq x < 25$	6
$25 \leq x < 33$	8
$33 \leq x < 41$	2
$41 \leq x < 49$	2

(2) The relative frequency distribution is summarized by the following table:

2-1 Low Temp $(^\circ F)$	Relative Frequency
$-15 \leq x < -7$	.038
$-7 \leq x < 1$	.038
$1 \leq x < 9$	.077
$9 \leq x < 17$	.154
$17 \leq x < 25$	.231
$25 \leq x < 33$	.308
$33 \leq x < 41$	.077
$41 \leq x < 49$	.077

(3) The following frequency histogram was created using Minitab (saved as a .jpg using "Copy Graph")
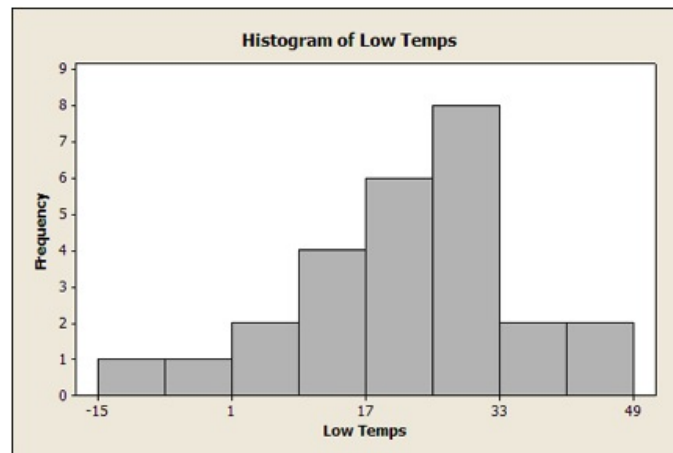
(4) The following relative frequency histogram was created using Minitab (saved as a .jpg using "Copy Graph")
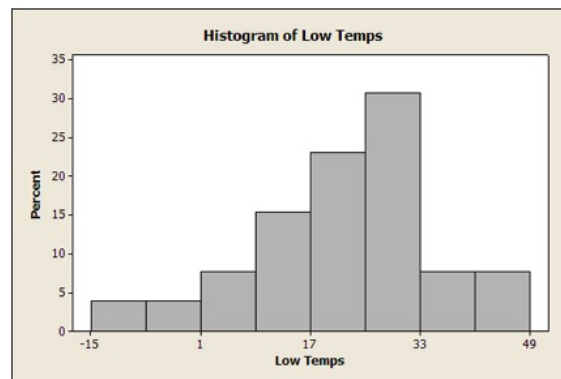
(5) The following stem and leaf plot uses split tens digits for the stems:

-1 3
-0 6
-0
1 234
1 5779
2 333
2 5689
3 00223
3 9
4 4
4 8

(6) The mean is $\bar{x} = 21.9$.
(7) The median is 23.
(8) The standard deviation is $s_x = 14.27$.
(9) The distribution is roughly bell-shaped with but skewed to the left.