Solutions to HW #1, evens only

- **1.2 a** "Time to assemble" is a *quantitative* variable because a numerical quantity (1 hour, 1.5 hours, etc.) is measured.
 - **b** "Number of students" is a *quantitative* variable because a numerical quantity (1, 2, etc.) is measured.

c "Rating of a politician" is a *qualitative* variable since a quality (excellent, good, fair, poor) is measured.

- d "State of residence" is a *qualitative* variable since a quality (CA, MT, AL, etc.) is measured.
- **1.14** a-b The variable being measured is a qualitative variable, which would be described as "ethnic origin."c The numbers represent the percentages of Army and Air Force members who fall in each of the four categories.

d-e The percentages falling in each of the four categories have already been calculated, and the pie chart and bar charts are shown in the figures below.



Air Force

f Use the pie chart for the Army. The appropriate percentage for the Army is 26.3% + 8.9% + 6.4% = 41.6%. For the Air Force (the bar chart), the percentage of minorities is 16.2% + 5.0% + 3.3% = 24.5%.

1.16 The range, R = largest - smallest is divided by the number of classes to obtain the minimum class width. A convenient class width will be slightly larger or equal to the minimum class width—answers will vary.

Note: If a larger class width is chosen, the number of classes needed may be slightly fewer than specified in the table. Here is one possible solution.

Number of measurements	Smallest and largest values	Number of classes	Range	Minimum class width	Convenient class width
75	0.5 to 1.0	8	0.5	.0625	.08 or .10
25	0 to 100	6	100	16.67	17 or 20
200	1200 to 1500	9	300	33.33	35 or 40

1.28 a Use the tens digit as the stem, and the ones digit as the leaf, dividing each stem into two parts.

b We use class intervals of length 5, beginning with the subinterval 30 to < 35. The tally is shown below

Class i	Class Boundaries	Tally	f_i	Relative frequency, <i>f_i/n</i>
1	30 to < 35	11111 11111 11	12	12/50
2	35 to < 40	11111 11111 11111	15	15/50
3	40 to < 45	11111 11111 11	12	12/50
4	45 to < 50	11111 111	8	8/50
5	50 to < 55	11	2	2/50
6	55 to < 60	1	1	1/50

The relative frequency histogram is shown below.



c The two graphs are very similar, with the relative frequency histogram a bit more visually appealing. If the student chose to create the stem and leaf plot without splitting the stems into two parts, the stem and leaf plot would not be very helpful in describing the data set.

d Use either the stem and leaf plot, the table or the relative frequency histogram. The proportion of children in the interval 35 to < 45 is (15 + 12)/50 = .54.

e The proportion of children aged less than 50 months is (12 + 15 + 12 + 8)/50 = .94.

2.6 a The stem and leaf plot below was generated by *Minitab*. It is skewed to the right.

Stem-and-Leaf Display: Revenues Stem-and-leaf of Revenues N = 10

```
Leaf Unit = 10000
 2
     0 33
(4)
    0 5555
 4
    0
4
1
    0 889
    1
 1
    1
 1
    1
 1
    1
 1
    1 9
```

2.14 The results will vary from student to student, depending on their particular type of calculator. The results should agree with Exercise 2.13.

2.16 **a** The range is
$$R = 6 - 1 = 5$$
.
b $\overline{x} = \frac{\sum x_i}{n} = \frac{31}{8} = 3.875$
c Calculate $\sum x_i^2 = 3^2 + 1^2 + \dots + 5^2 = 137$. Then
 $s^2 = \frac{\sum x_i^2 - \frac{(\sum x_i)^2}{n}}{n-1} = \frac{137 - \frac{(31)^2}{8}}{7} = \frac{16.875}{7} = 2.4107$

and $s = \sqrt{s^2} = \sqrt{2.4107} = 1.55$.

d The range, R = 5, is 5/1.55 = 3.23 standard deviations.