1.1 Experimental Units Identify the experimental units on which the following variables are measured:
a. Gender of a student …………………………………**Student**
b. Number of errors on a midterm exam……………….**Midterm Exam**
c. Age of a cancer patient ………………………………**Cancer patient**
d. Number of flowers on an azalea plant………………. **azalea plant**
e. Color of a car entering a parking lot …………………**Car**.

1.2 Qualitative or Quantitative? Identify each variable as quantitative or qualitative:
a. Amount of time it takes to assemble a simple puzzle ……………… quantitative
b. Number of students in a first-grade classroom…………………….. quantitative
c. Rating of a newly elected politician (excellent, good, fair, poor)…… qualitative
d. State in which a person lives……………………………………………. Qualitative

1.3 Discrete or Continuous? Identify the following quantitative variables as discrete or continuous:
a. Population in a particular area of the United States……………. discrete
b. Weight of newspapers recovered for recycling on a single day……….... continuous
c. Time to complete a sociology exam…..…………………………………. continuous
d. Number of consumers in a poll of 1000 who consider nutritional labeling on food products to be important…………………………………………………….... discrete

1.20 Consider this set of data:
4.5, 3.2, 3.5, 3.9, 3.5, 3.9, 4.3, 4.8, 3.6, 3.3, 4.3, 4.2, 3.9, 3.7, 4.3, 4.4, 3.4, 4.2, 4.4, 4.0, 3.6, 3.5, 3.9, 4.0.
a. Construct a stem and leaf plot by using the leading digit as the stem.

$$\left(\begin{array}{c|l} 1 & \\ 2 & \\ 3 & 2\ \ 3\ 4\ \ 5\ \ 5\ 5\ 6\ \ 6\ 7\ 9\ 9\ 9\ 9 \\ 4 & \ 0\ \ 0\ 2\ \ 2\ \ 3\ 3\ 3\ 4\ 4\ 5\ 8 \end{array}\right)$$ ……………………....leaf unit=Key =0.1

2.3 You are given n = 10 measurements: 3, 5, 4, 6, 10, 5, 6, 9, 2, 8.
a. Calculate *mean*=$\bar{X}$ =*58/10=5.8*
b. Find *median=m=5*
c. Find the mode = None

2.15 You are given n _ 8 measurements: 4, 1, 3, 1, 3, 1, 2, 2.
a. Find the range= R=4-1=3
b. Calculate *mean*=$\bar{X} = \frac{17}{8} = 2.13.$
c. Calculate **variance =s**^{2}= 8.875/7=1.27
d. Calculate **s**^{2}= (45 - (17^2)/8)/7=1.27
e. S =$\sqrt{1.27} = 1.13$
f. Approximating standard deviation (S)= Range/4 = 3/4=0.75

X_i	${X_i}^2$	$(X_i - \bar{X})^2$
4	16	3.4969
1	1	1.2769
3	9	0.7569
1	1	1.2769
3	9	0.7569
1	1	1.2769
2	4	0.0169
2	4	0.0169
17	45	8.8752

2.37 Suppose that some measurements occur more than once and that the data x1, x2, . . . , xk are arranged in a frequency table as shown here:

X_i	f_i	$X_i . f_i$	${X_i}^2 . f_i$
0	4	0	0
1	5	5	5
2	2	4	8
3	4	12	36
sum	15	21	49

a. Mean =$\bar{X} = \sum \frac{X_i . f_i}{n} = \frac{21}{15} = 1.40$, $n = \sum f_i$

b. Variance = $S^2 = \frac{\sum {X_i}^2 . f_i - \frac{(\sum X_i . f_i)^2}{n}}{n-1} = \frac{49 - \frac{(21)^2}{15}}{14} = 1.4$

2.42 Given the following data set: 8, 7, 1, 4, 6, 6, 4, 5, 7, 6, 3, 0

1. Sort data : 0, 1, 3, 4, 4, 5, 6, 6, 6, 7, 7, 8
2. Find Q1 =3+0.25*(4-3)=3.25………………Position Q1 = 0.25*(13)=3.25
3. Find Q2 =5+0.5*(6-5)=5.5…………………….Position Q2 = 0.5*(13)=6.5.
4. Find Q3 =6+0.75*(7-6)=6.75………………….Position Q3 = 0.75*(13)=9.75
5. IQR =Q3-Q1=6.75-3.25=3.50.
6. **Lower fence=** Q_1 - 1.5(IQR)=3.25- 1.5*3.5=-2
7. **Upper fence=** Q_3 + 1.5(IQR)=6.75+1.5*3.5=12
8. Find P90 =7+0.70*(8-7)=7.70………………Position P90 = 0.90*(13)=11.70
9. Find the range= R=8-0=8.
10. Calculate $mean = \bar{X} = \frac{56}{12} = 4.67.$
11. Calculate **variance =s^2**=70.67/11=6.42
12. S=2.53
13. Calculate the z-score for the smallest observations, x=0?
14. Z=(0-4.67)/2.53=-1.85
15. 11. Calculate the z-score for the largest observations, x=8?
16. Z=(8-4.67)/2.53=1.32

3.11 A set of bivariate data consists of these measurements on two variables, *x* and *y*: (3, 6) (5, 8) (2, 6) (1, 4) (4, 7) (4, 6)
a. Draw a scatterplot to describe the data.
b. Does there appear to be a relationship between *x* and *y*?
c. Calculate the correlation coefficient, *r*, .
d. Find the best-fitting line using the computing formulas.

x	y	xy	X^2	Y^2
3	6	18	9	36
5	8	40	25	64
2	6	12	4	36
1	4	4	1	16
4	7	28	16	49
4	6	24	16	36
19	**37**	**126**	**71**	**237**

1. $\bar{X} = \frac{\sum x}{n} = \frac{19}{6} = 3.17.$
2. $\bar{y} = \frac{\sum y}{n} = \frac{37}{6} = 6.17.$
3. $s_x^2 = \frac{\sum x^2 - \frac{(\sum x)^2}{n}}{n-1} = \frac{71 - \frac{(19)^2}{6}}{5} = 2.17, \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots..Sx = 1.47$
4. $s_y^2 = \frac{\sum y^2 - \frac{(y)^2}{n}}{n-1} = \frac{237 - \frac{(37)^2}{6}}{5} = 1.77, \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots.Sy = 1.33$
5. $s_{xy} = \frac{\sum xy - \frac{(\sum x * \sum y)}{n}}{n-1} = \frac{126 - \frac{(19*37)}{6}}{5} = 1.77$
6. $r = \frac{s_{xy}}{S_x S_y} = \frac{1.77}{(1.47*1.33)} = 0.903$
7. Find the slope, $b = \frac{r * S_y}{S_x} = \frac{(0.903*1.33)}{1.47} = 0.82,$
8. The *y*-intercept, $a = \bar{y} - b\bar{x} = 6.17 - (0.82 * 3.17) = 3.57.$
9. Write the regression line $y = a + bx = 3.57 + 0.82x$.
10. $If\ x = 10\ then\ \ y = 3.57 + 0.82(10) = 11.77.$