

## Laboratory Assignment 1

The table on the next page gives data for the two variables, 1974 per capita income and 1976 murder rate per 100,000 population, for each of the 50 states and are arranged according to increasing order of value for each variable and the state name has been appended for your information. The column labelled  $i$  indicates the ranks of the ordered observations and the column labelled  $(i-.5)/100$  is left blank for you to fill in the  $p_i$  values you must calculate. Use hand calculation to do Problems 1, 2, and 3.

1. Compute the following statistics for each variable. Show work:
  - (a) Mean  $\bar{x}$ , Variance  $s^2$ , Standard Deviation  $s$ , and coefficient of variation(CV). You may use the file `state.txt` (from the Download folder) and EXCEL or other software to calculate  $\sum x$  and  $\sum x^2$  needed.
  - (b) Range  $R$ , Median  $Q(0.5)$ , the lower quartile  $Q(0.25)$ , the upper quartile  $Q(0.75)$ , and IQR.
  - (c) The quantiles  $Q(0.025)$ ,  $Q(0.333)$ ,  $Q(.667)$  and  $Q(0.975)$ . Must use the table overleaf, and linear interpolation if needed.
2. Construct the following tables and plots for the `income` variable and use these plots to comment on the shape of the distribution.
  - (a) A table of frequencies and relative frequencies. Use 11 class intervals, each having length 300, with the midpoint of the first class interval being 3200.
  - (b) A Histogram of frequencies using your frequency table.
  - (c) A Stem and Leaf plot with stems 30, 32, 34 etc. Omit the last digit after rounding the numbers to the nearest 10.
  - (d) The Box Plot. Make sure that it exhibits the value of each key element in the plot and label them.
  - (e) A Normal Probability Plot using quantiles only for the following p-values:0.05,0.15,0.25,0.35, , 0.45,0.55,0.65,0.75,0.85,0.95
3. Construct the following tables and plots for the `murder` variable and use these plots to comment on the shape of the distribution.
  - (a) A table of frequencies and relative frequencies. Use 8 class intervals, each having length 2, with the midpoint of the first class interval being 1.
  - (b) A Histogram of frequencies using your frequency table.
  - (c) A Stem and Leaf plot with stems 1,2,3,...15.
  - (d) The Box Plot as in Problem 2.
  - (e) A Normal Probability Plot using quantiles as in Problem 2.
4. Use the link to the `state.JMP` data table provided in the **Current Laboratory Assignment** webpage to perform a JMP distribution analysis of these **two** variables. This analysis must contain the percentiles and the moments, a histogram, the box plot, a stem-and-leaf diagram, and a normal probability (quantile) plot of each of the two variables. Turn in only a single edited page for each analysis.
5. Select a random sample of size  $n = 10$  from the data for the 50 states for the **Population** variable using the attached random digits table. Enter this sample into a new JMP data table and save it as `sample.JMP` in your folder. Carry out a JMP analysis as in the previous problem and turn in the single edited page of results.

Due Thursday, September 11, 2008 (turn-in during lab)
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State	i	(i-.5)/50	Income	State	i	(i-.5)/50	Murder
Mississippi	01		3098	North Dakota	01		1.4
Arkansas	02		3378	South Dakota	02		1.7
Louisiana	03		3545	Iowa	03		2.3
New Mexico	04		3601	Minnesota	04		2.3
West Virginia	05		3617	Rhode Island	05		2.4
Alabama	06		3624	Maine	06		2.7
South Carolina	07		3635	Nebraska	07		2.9
Maine	08		3694	Wisconsin	08		3.0
Kentucky	09		3712	Connecticut	09		3.1
Tennessee	10		3821	Massachusetts	10		3.3
North Carolina	11		3875	New Hampshire	11		3.3
Vermont	12		3907	Oregon	12		4.2
Oklahoma	13		3983	Washington	13		4.3
Utah	14		4022	Kansas	14		4.5
Georgia	15		4091	Utah	15		4.5
Idaho	16		4119	Montana	16		5.0
South Dakota	17		4167	New Jersey	17		5.2
Texas	18		4188	Idaho	18		5.3
Missouri	19		4254	Vermont	19		5.5
New Hampshire	20		4281	Pennsylvania	20		6.1
Montana	21		4347	Delaware	21		6.2
Pennsylvania	22		4449	Hawaii	22		6.2
Indiana	23		4458	Oklahoma	23		6.4
Wisconsin	24		4468	West Virginia	24		6.7
Nebraska	25		4508	Colorado	25		6.8
Arizona	26		4530	Wyoming	26		6.9
Rhode Island	27		4558	Indiana	27		7.1
Ohio	28		4561	Ohio	28		7.4
Wyoming	29		4566	Arizona	29		7.8
Iowa	30		4628	Maryland	30		8.5
Oregon	31		4660	Missouri	31		9.3
Kansas	32		4669	Virginia	32		9.5
Minnesota	33		4675	New Mexico	33		9.7
Virginia	34		4701	Arkansas	34		10.1
Michigan	35		4751	California	35		10.3
Massachusetts	36		4755	Illinois	36		10.3
Delaware	37		4809	Kentucky	37		10.6
Florida	38		4815	Florida	38		10.7
Washington	39		4864	New York	39		10.9
Colorado	40		4884	Tennessee	40		11.0
New York	41		4903	Michigan	41		11.1
Hawaii	42		4963	North Carolina	42		11.1
North Dakota	43		5087	Alaska	43		11.3
Illinois	44		5107	Nevada	44		11.5
California	45		5114	South Carolina	45		11.6
Nevada	46		5149	Texas	46		12.2
New Jersey	47		5237	Mississippi	47		12.5
Maryland	48		5299	Louisiana	48		13.2
Connecticut	49		5348	Georgia	49		13.9
Alaska	50		6315	Alabama	50		15.1