

Homework 1, due in Lab Thurs Sept 8th ---- **Solutions**

(assignment for these solutions can be found on the last page)

1. The following observations are the lengths in days that 6 patients stayed in a hospital: 8, 10, 6, 12, 2, 10.

(a) Compute by hand the following summary statistics: mean, median, variance, standard deviation, 25th and 75th percentiles, and the inter-quartile range. You can use a calculator to take square roots, divide, etc. Make sure to report the units for each summary.

See (b) below.

(b) Enter the data in Minitab; verify that the calculations in (a) are relatively close to those obtained via Minitab. Minitab "interpolates" to get the quantiles which is just a little fancier than what we discussed in class.

Variable	Mean	StDev	Variance	Q1	Median	Q3	IQR
hw1.1	8.00	3.58	12.80	5.00	9.00	10.50	5.50

all in unit days, except for variance which is days².

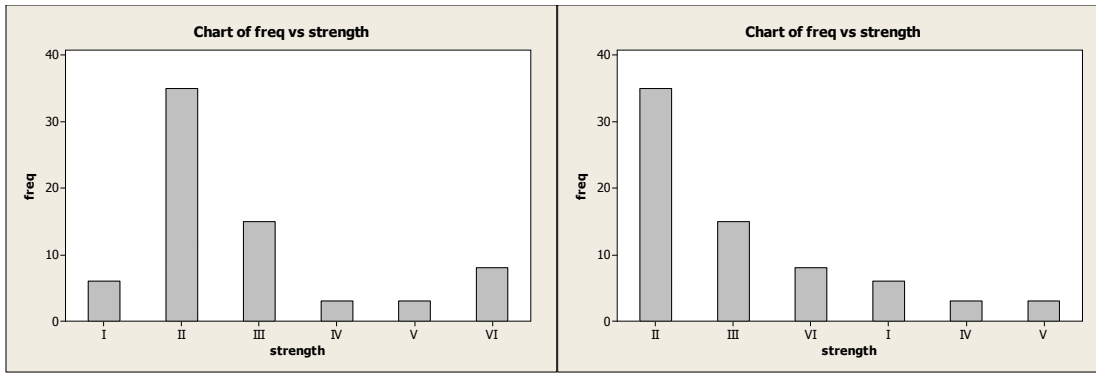
2. Use Minitab to create a bar graphs of the data in Example 2.2 of SW, page 12. Order the bars in two ways: As given in the text (in the order of strength of reaction), and in decreasing order of frequency (so the bars go from highest to lowest). Say a few words about what the graph suggests.

Input the data as this:

strength	freq
I	6
II	35
III	15
IV	3
V	3
VI	8

Then choose from the menu Graph/Bar Chart, select "Values from a table" at top, and use the Simple plot. Use variable "freq" for Graph variables and "strength" for Categorical variable. Select OK for the first plot. For the second plot, choose Bar Chart Options and select "Decreasing Y" to order the groups.

Roughly half of strength reactions are of type II, and nearly a quarter more are type III.



3. Do all calculations for this problem in Minitab, using the data in Exercise 2.7 of SW, page 24.

First open worksheet “dendnewb.xls” for the data.

(a) Compute the mean, median, standard deviation, and IQR.

Descriptive Statistics: branches

Variable	Mean	StDev	Median	IQR
branches	33.78	9.87	30.50	12.25

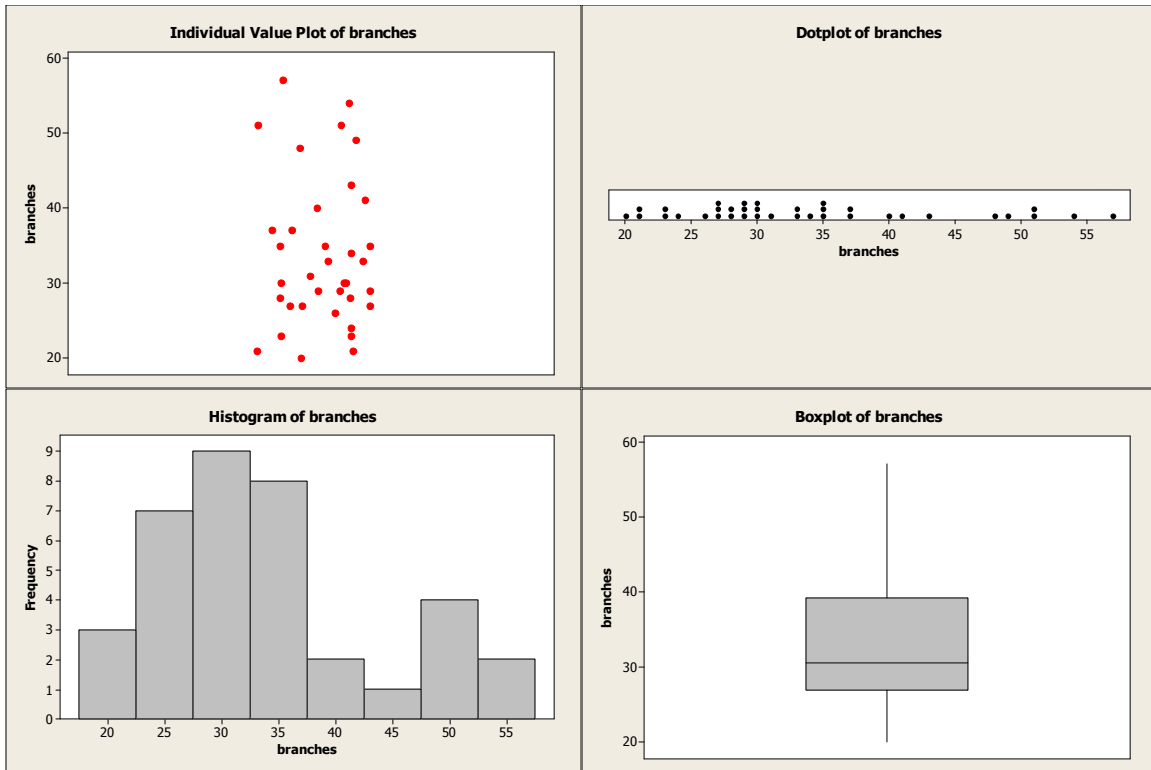
(b) Generate an individual values plot, dotplot, histogram, stem and leaf display, and boxplot for the data.

Stem-and-Leaf Display: branches

Stem-and-leaf of branches N = 36
 Leaf Unit = 1.0

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6  2  011334
15 2  677788999
(7) 3  0001334
14 3  55577
9  4  013
6  4  89
4  5  114
1  5  7
    
```



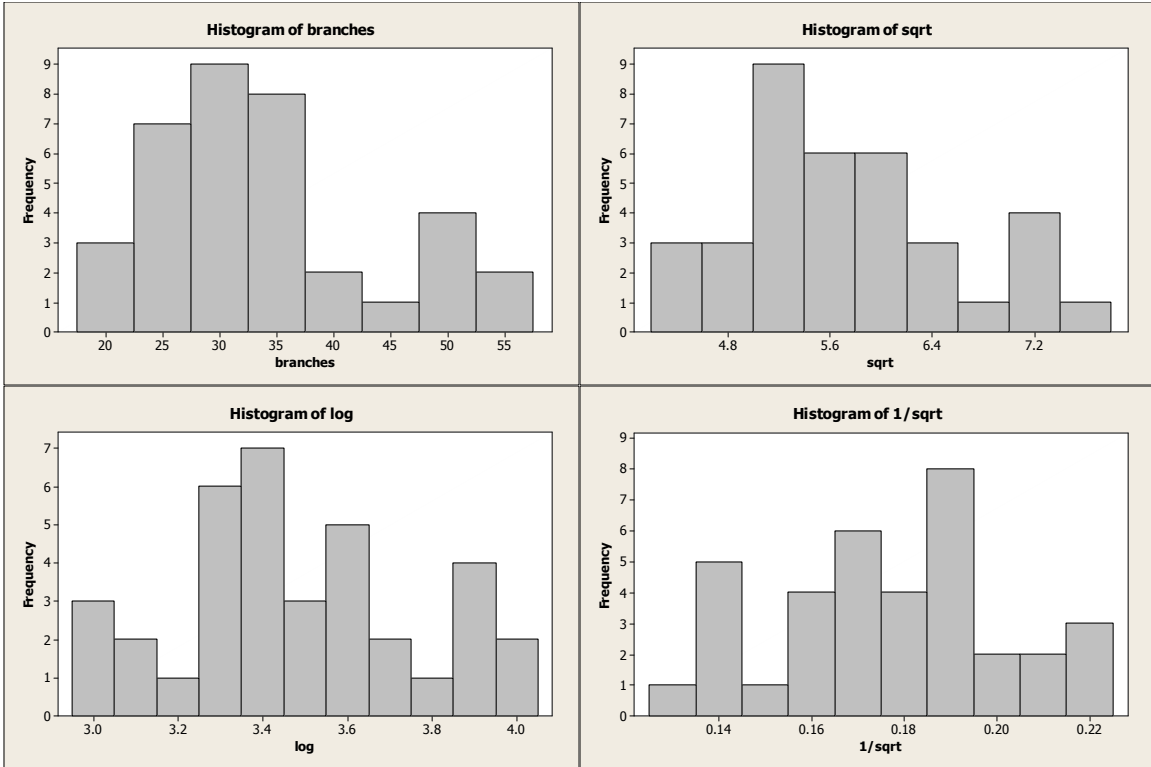
(c) Describe the shape of the distribution, being sure to consider symmetry, skewness, presence of outliers, and modality.

Primarily from the histogram, the data appear right-skewed, bimodal, without any obvious outliers.

4. Do problem 2.61 page 56 of SW. Use both histograms and boxplots to address the question of which transformation best makes the data look symmetric.

The sqrt transformation (raising each data value to the 0.5 power) is still right-skewed. Both the log transformation (taking the natural log of each data value) and the 1/sqrt transformation (raising each data value to the -0.5 power) makes the data roughly symmetric. By computing the skewness of each distribution (from descriptive statistics) it shows that the 1/sqrt transformation has the least amount of skewness (close to 0).

Variable	Skewness
branches	0.83
sqrt	0.59
log	0.33
1/sqrt	-0.06



Stat 538 – Biostatistics I
Homework 1 solutions

5/5

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Stat 538 - Biostatistics I - Fall 2005

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For problems 2 - 4, import the Minitab output into your favorite word processing software (like Word). Using the software, write up your solutions to these problems. You can intersperse your comments around the output, or have all the comments in one location, but make sure to carefully point out what in the output you are referring to in the discussion.