MATHEMATICS 150
2001/2002
PROBLEM SET 1

Solutions are due on **Thursday, October 11**. Solutions may be submitted in class or may be delivered **by 4:00 pm** to the instructor's office.

1. In part of a small sample survey on students in one program, fifteen students selected at random reported their anticipated total education-related debt by the time of graduation to the nearest hundred dollars. The sample amounts (re-expressed in thousands of dollars) were as follows.

<u>Sample Anticipated Graduation Debts ($000's)</u>

12.4	15.8	14.3	13.6	11.8
24.8	12.3	5.9	7.6	19.6
13.6	16.7	8.3	11.6	21.7

    a) List the data in order from smallest to largest and illustrate the data with a dot diagram.
    b) Display these data with stem-and-leaf display.
    c) Display these data with a box-and-whisker plot.

2. A sampling of 88 blue boxes produced the following weights of wine, spirits and beer glass (in grams)

3003	0	0	700	0	583	1129	0
0	6345	0	0	3835	194	664	366
2436	338	418	0	149	10889	210	4392
1970	0	0	391	356	256	0	4314
0	0	723	685	0	381	0	0
5820	0	0	303	511	0	5004	642
397	211	0	507	0	723	0	0
2785	442	0	4303	0	585	62	949
0	469	0	653	0	0	0	0
0	1329	1396	535	2643	7570	433	525
0	0	642	0	50	538	3424	0

Note: If you wish to analyze these data with computer software, they are available at

http://www.trentu.ca/academic/math/courses/stat/files/glass.dat

Convert the data set as follows. Delete all cases in which there was no glass (value =0). Convert all other values to kilograms rounded to the nearest tenth, rounding 5's *up*. (Eg, 3835 should be changed to 3.835 and then rounded to 3.8 and 50 should be changed to 0.05 and then rounded to 0.1.)
    a) Display the converted data set with a stem-and-leaf display with stem labels 0, 1, 2, 3, etc. (include a multiplication code, if appropriate.)
    b) Summarize the converted data with a frequency distribution based on the stem-and-leaf display.

3. For the *converted* data set in Problem 2, determine the following. (Use the *individual* converted values **NOT** the summary from Problem 2 b).)
    a) median
    b) first and third quartiles
    c) 10th and 90th percentiles

4. Illustrate the *converted* data set in Problem 2 with a box-and-whisker plot.

5. In order to determine the appropriate "flat-rate" to charge for a particular type of repair, a service centre operator had staff perform the repair several times to become familiar with the process and then do the same type of repair another set of times (mixed in with other, different repairs to match usual conditions) to determine a "benchmark". Collectively, the staff had 75 sample benchmark times. These sample times produced the following frequency distribution of times in minutes (overleaf.) Determine the median, the 10th and the 90th percentiles for these data.

5. (Continued)

<u>Sample Benchmark Repair Times</u>

Repair Time (Minutes)	Number of Cases
50 - 54	2
55 - 59	6
60 - 64	15
65 - 69	19
70 - 74	10
75 - 79	8
80 - 84	7
85 - 89	5
90 - 94	3

6. A customer survey involved investigating criteria that customers consider important for gas stations, including reasons for switching. Consider a subsample including only customers who had switched companies. The subsample produced the following numbers of customers giving each of the stated reasons as the *most important* reason for having switched *from* each of two companies. Combine the data for both companies into one data set and then use a Pareto diagram based on percentages to illustrate the combined data.

<u>Numbers of Customers Switching from Gas Companies</u>

Reason Given as Most Important	Company A	Company B
Price of Gas	31	19
Location	17	8
Other Companies' Promotions	6	14
Quality of Service	3	8
Other Companies' Features Such as Convenience Store	2	2
Other	3	4

7. For the data in Problem 1, determine the following:
a) mean
b) range
c) mean deviation
d) variance (Use the defining formula and show the related work.)
e) standard deviation
f) coefficient of variation

8. For the **converted** data set in Problem 2, determine the following: (Use the **individual** converted values **NOT** the summary from Problem 2 b).)
a) mean
b) range
c) variance (Use the calculating formula or a function key on a calculator or computer software.)
d) standard deviation (Use the calculating formula or a function key on a calculator or computer software.)
e) coefficient of variation

9. A Canadian Government report on wage settlements in June 1999 listed five agreements in public administration. The reported numbers of employees involved and the average annual base rate increases were as listed below. Determine the overall mean base rate increase.

Agreement	A	B	C	D	E
Number of Employees	1400	3200	1950	550	7600
Average Annual Base Rate Increase (%)	2.5	1.5	3.0	2.2	6.0

10. The total annual enrolments over all courses in an academic program over a five-year period were 837, 891, 954, 1041, and 1093.
a) What was the percentage year-over-year change from the second year to the third?
b) What was the total percentage change from the first year to the fifth.
c) What was the average percentage year-over-year change?