Math 121 **Test #1 Answers** **Fall 2009**

$(44, 70.5, 85, 88.5, 97)$, $\overline{x} = 79.3$.

1. (12 pts) $(6, 8, 11, 12, 12)$, $\overline{x} = 9.8$.

   (a) (4 pts) H_0 : The weight gain or loss is the same for the two groups.
   H_1 : The weight gain or loss is not the same for the two groups.

   (b) (4 pts) They accepted the alternative hypothesis.

   (c) (4 pts) They could have made a Type I error. (They could not have made a Type II error.)

2. (22 pts) $(0, 12.5, 18, 21.5, 22)$, $\overline{x} = 16.4$.

   (a) (3 pts) The direction of extreme is to the right. The values to the right become *less likely* under H_0 and *more likely* under H_1.

   (b) (8 pts) There are 2 **X**'s at or to the right of 5 in the H_0 picture, so $\alpha = \frac{2}{18}$. There are 8 **X**'s to the left of 5 in the H_1 picture, so $\beta = \frac{8}{18}$.

   (c) (4 pts) There are 4 **X**'s at or to the right of 5 in the H_0 picture, so p-value $= \frac{4}{18}$.

   (d) (3 pts) A Type I error would be to conclude that the components were shipped by ground when, in fact, they were shipped by air.

   (e) (4 pts) A Type II error would be to conclude that the components were shipped by air when, in fact, they were shipped by ground.

3. (16 pts) $(8, 13, 14, 15.5, 16)$, $\overline{x} = 13.9$.

   (a) (3 pts) The population is all non-overweight adults.

   (b) (3 pts) The sample is the 622 non-overweight adults who participated in the study.

   (c) (4 pts) The researchers observed the amount of soft-drink consumption, which type of soft drink was consumed (diet or regular), and they measured the BMI (body-mass index). Several people said that weight was a variable. However, the article says that it was the BMI, not the weight, that was recorded for each individual.

   (d) (4 pts) Soft-drink consumption and type of soft drink are explanatory. BMI is response.

   (e) (2 pts) They made adjustments for age, gender, and ethnicity.

4. (14 pts) $(2, 7, 10, 11.5, 14)$, $\overline{x} = 9.4$.

   (a) (4 pts) The sampling method would be stratified sampling.

(b) (6 pts) Because of the different sizes of the groups, we have to use a weighted average. The overall average would be $\frac{150 \cdot 4 + 472 \cdot 6}{622} = 5.52$.

(c) (4 pts) It is a statistic. It is a characteristic of the sample, not the population.

5. (10 pts) $(4, 7.5, 10, 10, 10)$, $\overline{x} = 8.5$.

   (a) (2 pts) Qualitative. It is not a number.

   (b) (2 pts) Quantitative discrete. The value must be a whole number.

   (c) (2 pts) Quantitative continuous. The true level could be any real number within a realistic range. Just because we traditionally round the number off to a whole number, that does not make the variable discrete.

   (d) (2 pts) Quantitative discrete. The value must be a whole number.

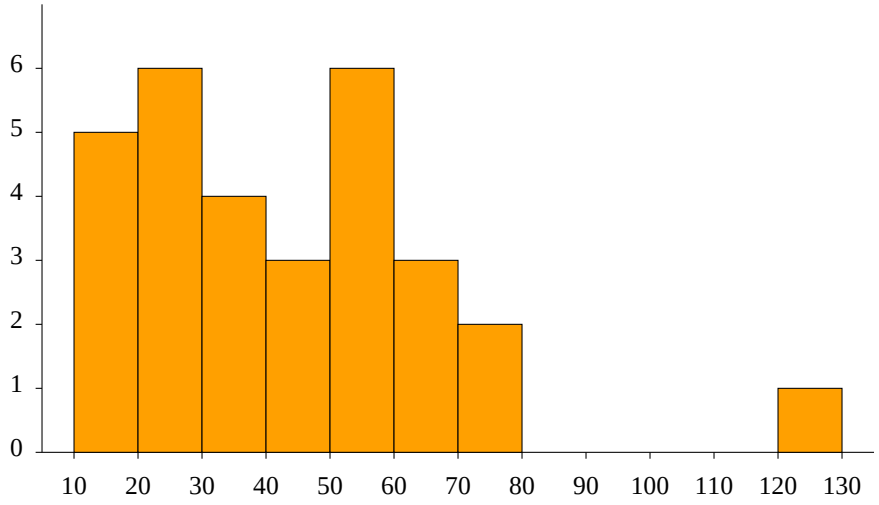
   (e) (2 pts) Qualitative. It is not a number.

6. (16 pts) $(5, 9.5, 11, 15, 16)$, $\overline{x} = 11.8$.

7. (4 pts) The two appropriate displays are stem-and-leaf displays and histograms. That is because the price data are *quantitative*. The other two types of display are for *qualitative* data.

8. (8 pts) For the stem-and-leaf display, probably the only good choice is to split the numbers between the 10's digit and the 1's digit. For the histogram it would be convenient to let the class width be 10 and to begin with the class $[10, 20)$. The stem-and-leaf display and the histogram are shown below.

Stem	Leaf
1	3 6 6 7 9
2	2 5 6 6 7 7
3	0 0 2 3
4	4 6 7
5	0 1 1 2 6 7
6	0 2 8
7	0 4
8	
9	
10	
11	
12	0



9. (4 pts) The distribution is skewed to the right. You could say that it is unimodal or that it is bimodal, depending on how you interpret the class $[50, 60)$. You could mention that 120.81 appears to be an outlier. The distribution is not symmetric or uniform.

10. (10 pts) $(0, 10, 10, 10, 10)$, $\overline{x} = 9.6$.

    Enter `212→rand` to set the seed. Then enter `randInt(1,30)` and hit `ENTER` five times. You should get the numbers 2, 14, 24, 15, and 18. The symbols for those companies are PFE, DD, PG, AXP, and TRV.