Math 121 **Test 2 Solutions** **Spring 2006**

$n = 19$, $(15, 39, 58, 80, 95)$, $\overline{x} = 57.8$

1. $n = 19$, $(1, 4, 5, 6, 8)$, $\overline{x} = 4.9$ out of 8.

   (a) The distribution is unimodal and skewed to the right.

   (b) a is the mode because it is directly under the peak. b is the median and c is the mean because the skewness pulls the mean farther away from the peak than it pulls the median.

2. $n = 19$, $(8, 11.5, 17, 19, 20)$, $\overline{x} = 15.4$ out of 20.

   Use the TI-83. Put the list of numbers into $\mathtt{L_1}$ and enter the function `1-Var Stats L`$_1$. You can read off the mean, the standard deviation, and the five-number summary.

   (a) The mean is 12.

   (b) The standard deviation is 8.258.

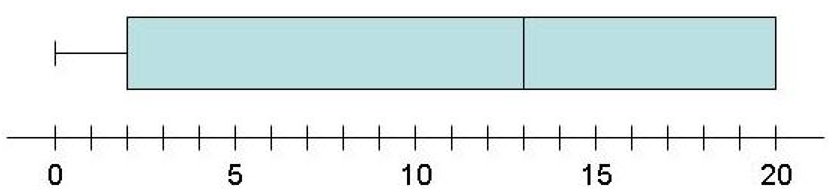
   (c) The five-number summary is: min $= 0, Q_1 = 2$, median $= 13, Q_3 = 20$, max $= 20$.

   (d) The IQR is $Q_3 - Q_1 = 20 - 2 = 18$.

   (e) Let $p = 70$ and $n = 11$ in the formula. Then compute $r = 1+(0.7)(10) = 8$. The 70^{th} percentile is the number in the 8^{th} position, which is 19.

3. $n = 19$, $(0, 3, 4, 4, 4)$, $\overline{x} = 3.5$ out of 4.

   The boxplot:



4. $n = 19$, $(0, 5, 11, 12, 14)$, $\overline{x} = 8.8$ out of 14.

   (a) The total area is 1.

   (b) In the left drawing, the tick mark is at $\frac{1}{4}$, making the area of the rectangle 1. In the right drawing, the tick marks are at $\frac{1}{4}$ and $\frac{1}{2}$, making the are of the triangle 1.

   (c) The direction of extreme is to the right, so α is the area to the right of 2 in the H_0 picture. That area is 0.5. β is the area to the left of 2 in the H_1 picture. That area is 0.25.

5. $n = 19$, $(0, 0, 7, 12, 12)$, $\overline{x} = 6.2$ out of 12.

   (a) Use `normalcdf(-E99,-1.38)` and get 0.0838.

   (b) Use `normalcdf(1.15,2.96)` and get 0.1235.

   (c) Use `invNorm(0.15)` and get -1.036.

6. $n = 19$, $(0, 6, 11, 12, 12)$, $\overline{x} = 8.4$ out of 12.

   (a) Compute the z-score of 125: $z = \frac{125-100}{15} = 1.67$. Then use `normalcdf(1.67, E99)` and get 0.0475. Or you can use `normamlcdf(125, E99, 100, 15)` and get 0.0478.

   (b) Compute the z-scores of 85 and 115: $z = \frac{85-100}{15} = -1$ and $z = \frac{115-100}{15} = 1$. Then use `normalcdf(-1, 1)` and get 0.6826. Or you can use `normalcdf(85, 115, 100, 15)` and get the same answer.

   (c) The answer is the 99^{th} percentile of the distribution. You can use `invNorm(.99)` and get 2.326. Multiply this by 15 and add that to 100 to get 134.9. Or you can use `invNorm(.99, 100, 15)` and get the same answer.

7. $n = 19$, $(0, 3, 5, 9, 10)$, $\overline{x} = 5.5$ out of 10.

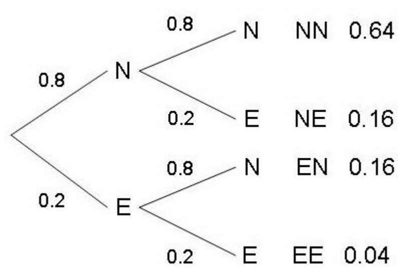
   Enter {`5, 3, -4`} into list L_1 and enter {`3/18, 5/18, 10/18`} into list L_2. Then enter `1-Var Stats` L_1,L_2. Read the answers from the display.

   (a) The mean is -0.5556.

   (b) The standard deviation is 3.905.

8. $n = 19$, $(0, 0, 1, 7, 8)$, $\overline{x} = 3.2$ out of 10.

   (a) To see all the possibilities and their probabilities, draw a tree diagram and label the branches with the probabilities. In the drawing, E means error and N means no error.



   The drawing shows that the probability of no error ($\hat{p} = 0.0$) is 0.64. It shows that the probability of 1 error out of 2 ($\hat{p} = 0.50$) is 0.32 (0.16 twice). And it shows that the probability of 2 errors out of 2 ($\hat{p} = 1.0$) is 0.04. So the sampling distribution of $\hat{p}$ is

$\hat{p}$	Prob.
0.0	0.64
0.5	0.32
1.0	0.04

(b) Enter {`0.0, 0.5, 1.0`} into list $\texttt{L}_1$ and enter {`0.64, 0.32, 0.04`} into list $\texttt{L}_2$. Then enter `1-Var Stats` $\texttt{L}_1$,$\texttt{L}_2$. The displays shows that the mean is 0.2 and the standard deviation is 0.2828. Or you can use the Central Limit Theorem for Proportions which says that $\mu_{\hat{p}} = p = 0.2$ and $\sigma_{\hat{p}} = \sqrt{\frac{p(1-p)}{n}} = \sqrt{\frac{(0.2)(0.8)}{2}} = 0.2828$.

9. $n = 19$, $(0, 0, 0, 1, 10)$, $\overline{x} = 1.9$ out of 10.

   Use the Central Limit Theorem to get the sampling distribution of $\hat{p}$. It is normal with mean $\mu_{\hat{p}} = 0.2$ and standard deviation $\sigma_{\hat{p}} = \sqrt{\frac{(0.2)(0.8)}{500}} = 0.01789$. Then use `normalcdf(0.22, E99, 0.2, 0.01789)` to get 0.1318.