Exam 1 BIOS 600-001

Name: _____

1. Label each as Qualitative or Quantitative (3 points each).

   Blood Pressure — Quantitative

   Cancer Type(Colon, Breast, etc) — Qualitative

2. Here are 11 values for the number of monthly visitors to a fertilization clinic.

   15 8 29 16 5 11 15 10 11 14 20

   5 8 10 11 11 14 15 15 16 20 29

   (a). What is the median number of monthly visitors (3 points)?

   14

   (b). What is the range of these set of monthly number of visitors (3 points)?

   29 – 5 = 24

   (c). What is Q1, Q3 and the IQR (4 points)?

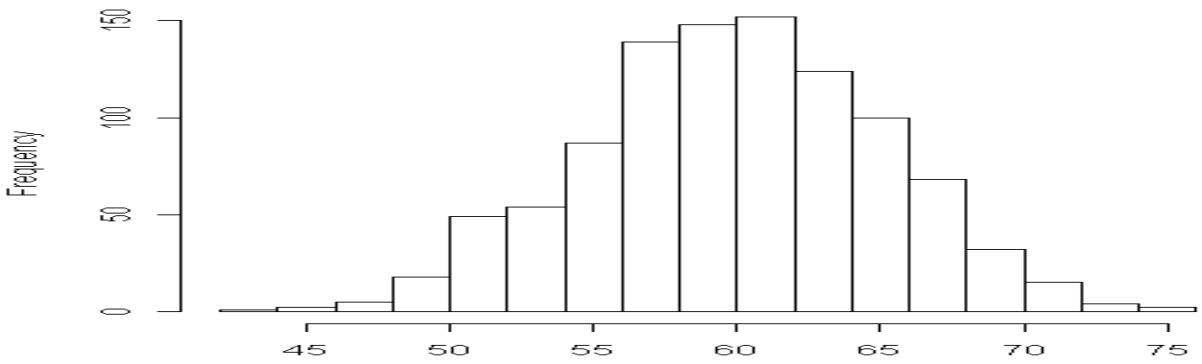
   Q3-Q1=IQR: 15.5-10.5 = 5

3. Find the mean and standard deviation of each group (12 points).

Group 1	Group 2
63	67
66	64
67	70
65	71
69	63
66	

Mean	=66	Mean	= 67
Std. Deviation	=2	Std. Deviation	= 3.536

Use this histogram to answer question 4.



4. (a). Does this histogram indicate that the data are skewed? If so, in what direction (4 points).

There is no evidence of skewness in the above histogram.

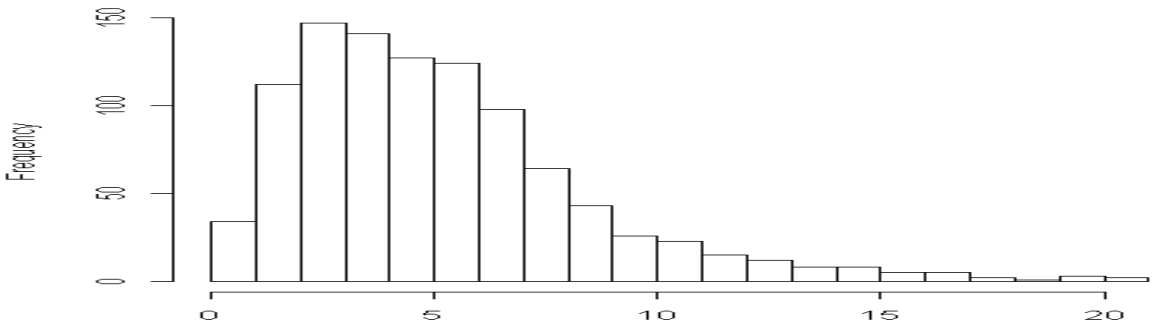
(b). Without counting the frequencies, what single value does the median appear to be? Could this also be the mean (3 points)?

60 appears to be the median. Since the data appear symmetric, the mean would be equal to the median.

(c). What distribution does this data appear to be from (1 point)?

Normal distribution

Use the following histogram to answer question 5.



5. (a). Does this histogram indicate that the data are skewed? If so, in what direction. (4 points)

This data has strong positive skew.

(b). Which value would be larger for this data, the median or the mean (4 points)?

With positive skew, the mean is larger than the median.

6. A doctor at UNC had 5 Lymphoma patients under the same treatment. The following probability mass function displays the probability of successful remission for patients. The value 1 indicates that 1 of the 5 patients had remission on the treatment.

# of Patients that had remission	0	1	2	3	4	5
Probability	0.168	0.361	0.309	0.132	0.028	0.002

(a). Is this a valid PMF? What facts about PMFs did you use to decide validity (2 points)?

Each of the probabilities are between 0 and 1 and the probabilities for the sample space sum to 1.

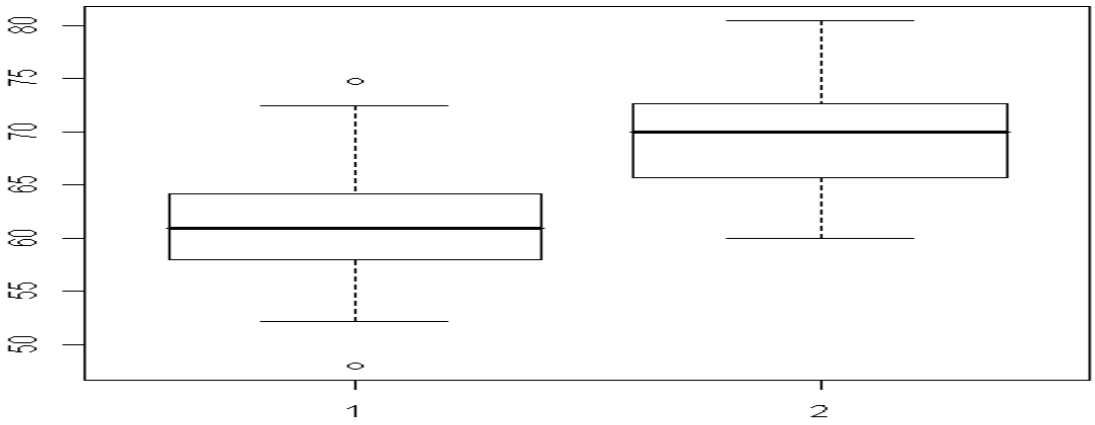
(b). What is the probability that all the patients succeed (3 points)?

$Pr(X=5)=0.002$

(c). What is the probability that 2 or more patients succeed (3 points)?

$Pr(X\geq 2)=0.309+0.132+0.028+0.002=0.471$

Use the following boxplots to answer question 6.



7. (a). Does Site 1 or Site 2 appear to have a larger median value(2 points)?

Site 2 has a larger median value, as displayed by the value within the box.

(b). How many outliers does each site have(2 points)?

Site 1: 2 Site 2: 0

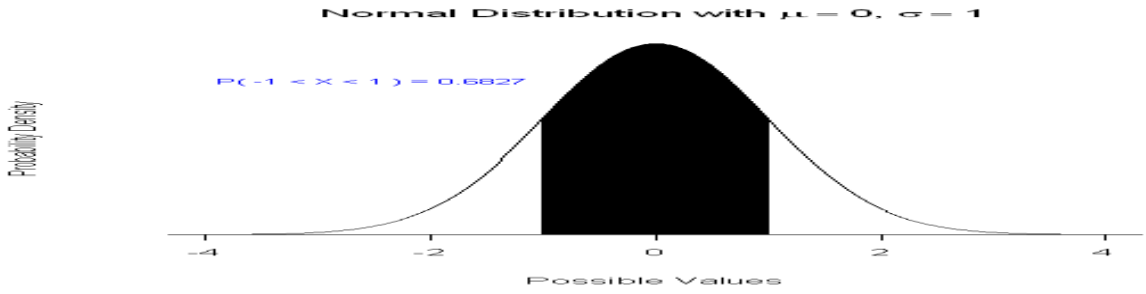
8. A particular clinic records the number of patients it sees every day. The population average number of patients seen is 100 with a population standard deviation of 8. Assuming that the number of patients seen each day is normally distributed, answer each of the following questions. Please include sketches.

(a). What is the probability that the clinic sees 102 patients on any one day (3 points)?

Since the data are normal, Pr(X=102)=0

(b). What is the probability that the clinic sees between 92 and 108 patients on any one day (7 points)?

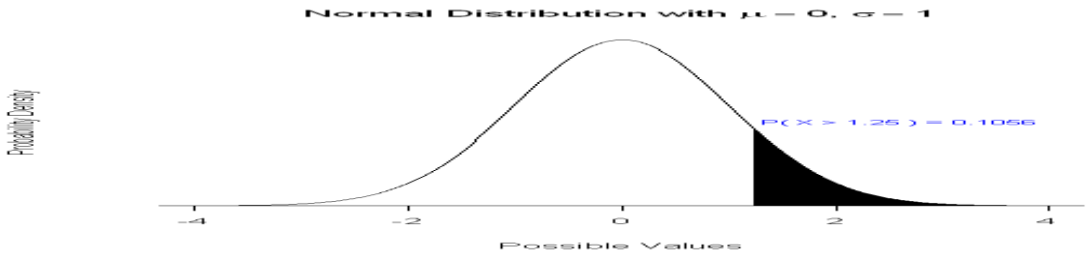
Pr(92 ≤ X ≤ 108) = Pr(-1 ≤ Z ≤ 1) = 0.6826



The probability that the clinic will see between 92 and 108 patients on any one day is 68.26%.

(c). What is the probability that the clinic sees more than 110 patients (7 points)?

Pr(X > 110) = Pr(Z > 1.25) = 0.1056



The probability that the clinic sees more than 110 patients is 10.56%.

(d). What is the 15th, 50th, and 90th percentile of the number of patients seen in one day (8 points)?

15th: From Table B – Z=-1.04 or -1.03 , thus -1.03*8 + 100 = 91.76 is the 15th percentile.

50th: From Table B – Z=0, Thus 100, the mean value, is the 50th percentile.

90th: From Table B – Z=1.28, thus 1.28*8 + 100 = 110.24 is the 90th percentile.

(e). We take a random sample 9 days of the number of patients in this clinic. The average number of patients for these 9 days is 104.5. Now assume that we do not know the true average number of patients from above, construct an exact 99% confidence interval for the average number of patients in this clinic. (6 points)

104.5 ± 2.576*8/sqrt(9) : 104.5±6.87: (97.63 , 111.37)

(f).Using the information from part (e), construct an exact 90% confidence interval for the average number of patients. Does this confidence interval contain the population average number of patients from parts (a)-(d) (6 points)?

104.5 ± 1.645*8/sqrt(9) : 104.5±4.39: (100.11 , 109.89)

This does not contain the mean of 100 used in the previous problems.

9. An investigator wants to conduct a study of birth weights. She knows that the average birth weight in her population is normally distributed with known standard deviation 300 grams . She wants the margin of error for the 95% confidence interval to be 20. How many infants must she enroll to get this margin of error (7 points)?

N=(1.96*300/20)^2

N = 864.36

Thus N= 865. She needs to recruit 865 infants into her study to make her C.I. have a margin of error of 20.