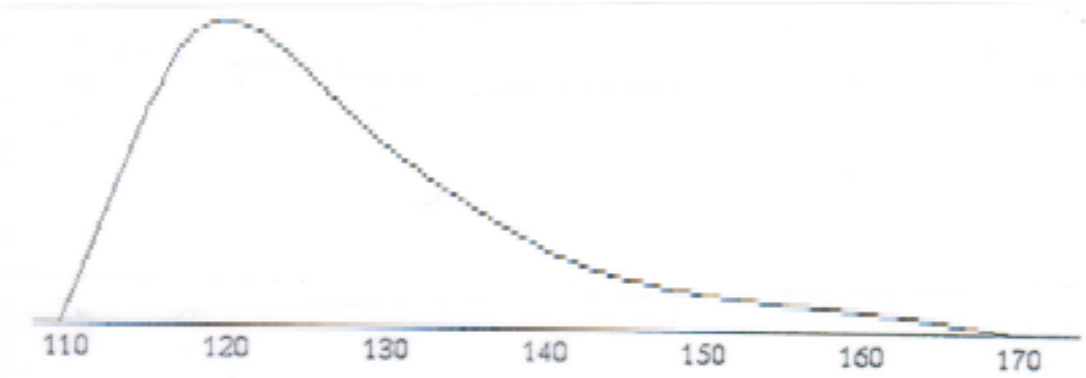
STAT 2507 — Fall 2011

Some sample questions for the term test (the actual test can have more questions)

THE MIDTERM TEST COVERS CHAPTERS 1-6 INCLUSIVE.



Question 1. Consider the distribution of measurements above. Which of the following are true?

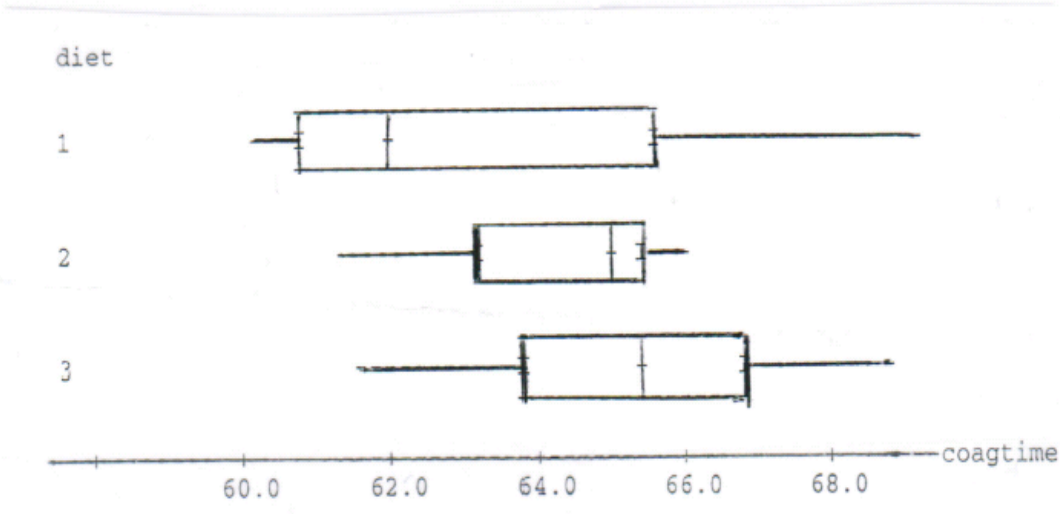
I) The mean exceeds the median.

II) The interquartile range is less than 45.

III) The distribution of the standardized scores (z-scores) of the measurements will be approximately bell-shaped, with a mean of zero, and standard deviation of one.

(a) Only I is true. **(b)** Only II is true.
(c) Only III is true. **(d)** Only I and II are true. $(*)$

Question 2 & 3. Consider the following Minitab generated boxplots of coagulation times in seconds for samples of blood drawn from animals receiving three different diets denoted 1, 2, and 3 :



Question 2. Which of the following statements are true?

I) The animal that had the longest coagulation time was given diet 3 .

II) The greatest variability occurs with diet 3.

III) Diet 1 shows evidence of right(positive) skewness but diet 2 shows evidence of left(negative) skewness.

(a) Only I is true. **(b)** Only II is true. **(c)** Only III is true.(∗) **(d)** Only I and II are true.

Question 3. Which of the following are true (re boxplots above)?

I) Approximately 25% of animals on diet 2 had coagulation times in excess of 63.

II) The smallest upper (third) quartile is for diet 1.

III) We can see that the mean for diet 1 is less than 62 seconds.

(a) Only I is true. **(b)** Only II is true. **(c)** Only III is true. **(d)** All are false.(∗)

Question 4. Given the following stem and leaf display of students' GPAs (grade point averages):

Stem-and-leaf of GPA N = 100
Leaf Unit = 0.10

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  1      1   1
  2      1   3
  4      1   44
  5      1   6
  7      1   88
 24      2   000000000000111111
 35      2   33333333333
 49      2   44444444555555
(11)     2   66666677777
 40      2   888889999999
 28      3   000000000011111
 12      3   2333
  8      3   4444
  4      3   667
  1      3   8
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Which of the following values for the IQR and sample standard deviation, respectively, should be the correct ones (approximately)? (long calculations are not required in order to determine the correct answer)

(a) 0.7 ; 0.68(∗) **(b)** 1.4 ; 1.62 **(c)** 0.7 ; 1.62 **(d)** 1.4 ; 0.68

Question 5. Which of the following is/are most likely to be observed if one tossed a balanced coin 5 times?

I) 5 consecutive heads or 5 consecutive tails

II) 2 heads followed by 3 tails

III) alternating heads and tails(starting with either head or tail)

(a) Only I . **(b)** Only II. **(c)** Only III. **(d)** Both I and III. (∗)

Question 6. The value of Z representing the first quartile of the standard normal distribution is

(a) 0.67 **(b)** -0.67 (∗) **(c)** 1.28 **(d)** -1.28

Question 7. The probability of rain today is 0.2. The same holds for tomorrow. The probability of rain on both days is 0.1. What is the probability of some rain tomorrow if it is raining today?

(a) 0.2. **(b)** 0.5 (*) **(c)** 0.1 **(d)** 0.04

Question 8. You are contemplating making one of 3 investments: A, B, or C. Investment A has a 0.64 chance of being successful. The success of investment B depends on 2 smaller investments: B1 and B2, each having 0.4 chance of success. The success of B1 is independent of the success of B2. B will be a success if at least one of B1 or B2 is a success. Investment C depends on 2 smaller investments: C1 and C2, each having a 0.8 chance of success. The success of C1 is independent of the success of C2. C will be a success if both C1 and C2 are successful. Given this information, determine which of the investments A, B, or C has the best chance of success.

(a) B **(b)** both A and C **(c)** both A and B **(d)** all have the same chance.(*)

Question 9. In order to determine the quality of a shipment of 20 parts, a sample of 3 items is randomly selected without replacement from the shipment. Four of the 20 items in the shipment are actually defective. Let Y be a random variable representing the total number of defective items in the sample. Then P(Y = 1) is

(a) 0.48 **(b)** 0.60 **(c)** 0.08 **(d)** 0.42 (∗)

Question 10. In a certain factory, machines I, II, and III are all producing springs of the same length. Of their production, machines I, II, and III produce 2%, 1%, and 3% defective springs, respectively. Of the total production of springs in the factory, machine I produces 35%, machine II produces 35%, and machine III produces 30%. Suppose that one spring is selected at random from the total springs produced in a day. What is the probability that the selected spring was produced by machine III, given that it is defective?

(a) 90/195(**) **(b)** 90/180 **(c)** 120/195 **(d)** 120/215

Question 11. If $P(A \cup B) = 0.8$, $P(A) = 0.3$, and $P(B) = 0.6$ then $P(A \cap B')$ is:
(a) 0.1 **(b)** 0.2 $(*)$ **(c)** 0.3 **(d)** 0.4

Question 12. Suppose that X is a random variable with probability distribution: $P(X = k) = 0.02k$, where k takes the values 8 , 12 , 10 , 20 . Find the mean of X .

(a) 12.20 **(b)** 14.16 $(*)$ **(c)** 10.12 **(d)** 12.82.

Question 13. The number of times your professor erases the board during a 90-minute lecture has a Poisson distribution with a mean of 6 times. What is the probability that your professor will erase the board exactly 5 times during a 90-minute lecture?

(a) 0.5420 **(b)** 0.1606 $(*)$ **(c)** 0.0030 **(d)** 0.4124

Question 14. A rifleman has a 20% chance of hitting a target, with all attempts being independent of each other. If he shoots at a target 10 times, what is the probability he will hit the target at least once?

(a) 0.8926 $(*)$ **(b)** 0.8000 **(c)** 0.2000 **(d)** 0.2684

Question 15. Suppose you roll a pair of fair dice. What is the probability that the number of dots on the two dice sum to a number that is divisible by 3?

(a) 3/36 **(b)** 2/36 **(c)** 18/36 **(d)** 12/36 $(*)$

Question 16. Five percent of all items sold by a mail-order company are returned by customers for a refund.
I) The probability that, of two items sold during a given hour by this company, both will be returned for a refund is
(a) 0.05 **(b)** 0.0025 $(*)$ **(c)** 0.9025 **(d)** 0.0055
II) The probability that, of two items sold during a given hour by this company, exactly one item will be returned for a refund is
(a) 0.095 $(*)$ **(b)** 0.0475 **(c)** 0.5 **(d)** 0.0074

Question 17. The weights of chocolate bars produced by a certain machine vary according to a normal distribution with a mean of 8.1 oz. and a standard deviation of 0.1 oz. What weight should be advertised on the chocolate bar wrappers so that only about 1% of bars are underweight?

(a) 7.77 oz **(b)** 8.33 oz **(c)** 7.87 oz $(*)$ **(d)** 8.23 oz

Question 18 Assume that the salaries of school teachers in a certain country is normally distributed with a mean of \$22,500 and a standard deviation of \$1,000. What proportion of the salaries will be between \$22,000 and \$23,000?

(a) 0.0475 **(b)** 0.3830 $(*)$ **(c)** 0.1915 **(d)** 0.8085

Question 19 You are given the equation $y = 2.3 - 0.8x$ of the least-squares regression line of y on x. If $S_y^2 = 4S_x^2$, the correlation coefficient r between x and y is
(a) 0.6 **(b)** -0.8 **(c)** -0.4 $(*)$ **(d)** not computable.