

MATH 23 - STATISTICS - THIRD TEST - FALL 2013

Do all questions and show all the work. The total number of points in the test is 106.

Due 11/25/2013

Part I (Descriptive Statistics)

- (10 points) Find the mean, the mode, the first and third quartiles, the range, the median and standard deviation for the following set of sample data.
 - 5, 9, 12, 10, 8, 15, 9, 8, 17
- The mean of the scores in a Statistics exam is 80.83 with standard deviation 2.2, use Tchebychev Theorem to:
 - (2 points) Find an interval that contains at least 75% of the data.
 - (2 points) Find an interval that contains at least 88.9% of the data.
- The following table represents the results of the first quiz and the final exam on a sample of seven students of a Math Class at a college:

I quiz	50	50	70	70	98	80	98
Final	35	25	55	50	90	56	86

- (3 points) Draw the scattered plot of the set of data.
- (3 points) Interpret the fact that the correlation coefficient is $r = .977$
- (5 points) Plot the least square line $y = 1.186x - 30.739$, make sure to include the point (\bar{x}, \bar{y}) and the y -intercept.
- (3 points) What will be the prediction for the final if the first quiz is 85?

Part II (Probability and discrete distributions)

- Three cards are randomly selected from a standard 52 card deck without replacement. Find the probabilities of the following events:
 - (3 points) All cards are Aces.
 - (3 points) All cards are Diamonds.
 - (3 points) First is a King, the second is an Ace and the third one is another Ace.
- A number is selected randomly from the list $\{1, 2, 3, 4, 5, 6, 7, 8, 9, 10\}$. Consider the following events:
A= The number selected is less or equal to 7. B= The number selected is more than 2.
 - (3 points) Compute $P(A)$ and $P(B)$.
 - (3 points) Explain the meaning in this situation of the event $A \cap B$. Find $P(A \cap B)$.
 - (3 points) Explain the meaning in this situation of the event $A \cup B$. Find $P(A \cup B)$.
- A biologist is studying a new hybrid of tomato. It is known that the seeds of the hybrid have probability .70 of germinating. If six seeds are planted, what is the probability that
 - (3 points) exactly 4 germinate?

- (b) (3 points) at least 4 germinate?
4. A baseball player hits the ball 40% of the times. What is the probability of getting:
- (a) (3 points) exactly four hits in 9 opportunities.
- (b) (3 points) at most four hits in 9 opportunities.
- (c) (5 points) If the random variable X represents the amount of hits in 9 opportunities, what kind of distribution of probability is represented in this experiment? what is the expected value μ and standard deviation σ ?
5. Consider the following probability distribution:

x	1	2	3	4	5
P(x)	.21	.12	.18	.25	

- (a) (3 points) Complete the table and sketch the graph of the distribution.
- (b) (5 points) Calculate the expected value.
- (c) (5 points) Calculate standard deviation.

Part III (Continuous distributions and Estimation)

1. Sketch a graph that represents each of the following probabilities, when Z is distributed normal standard and find the actual probabilities.
- (a) (3 points) $P(Z < -1.5)$
- (b) (3 points) $P(-.72 < Z < 1.65)$
- (c) (3 points) $P(Z > 1.2)$
2. Let Z have a standard normal distribution. For each of the following probabilities, draw an appropriate diagram, shade the appropriate region and determine the value of Z_c .
- (a) (3 points) $P(0 < Z < Z_c) = .4671$
- (b) (3 points) $P(Z_c < Z < 0) = .2995$
3. (5 points) The weights of metal discarded in one week by households are normally distributed with a mean of 3.11 lb. and a standard deviation of .96 lb. Find the probability that a randomly selected household discards more that 3.00 lb. of metal in a week.
4. Let x be a random variable representing white blood cell count per cubic milliliter of blood. Assume that x has a normal distribution with $\mu = 7500$ and $\sigma = 1750$. A test result of $x < 3500$ is an indication of bone marrow depression (Leukopenia).
- (a) (5 points) What is the probability that, on a single test, x is less that 3500.
- (b) (5 points) Suppose that the doctor uses the average \bar{x} of two tests taken a week apart. What can we say about the distribution of \bar{x} ? What is the probability of $\bar{x} < 3500$.