Math 166 Exam 2, Form A Fall 2008

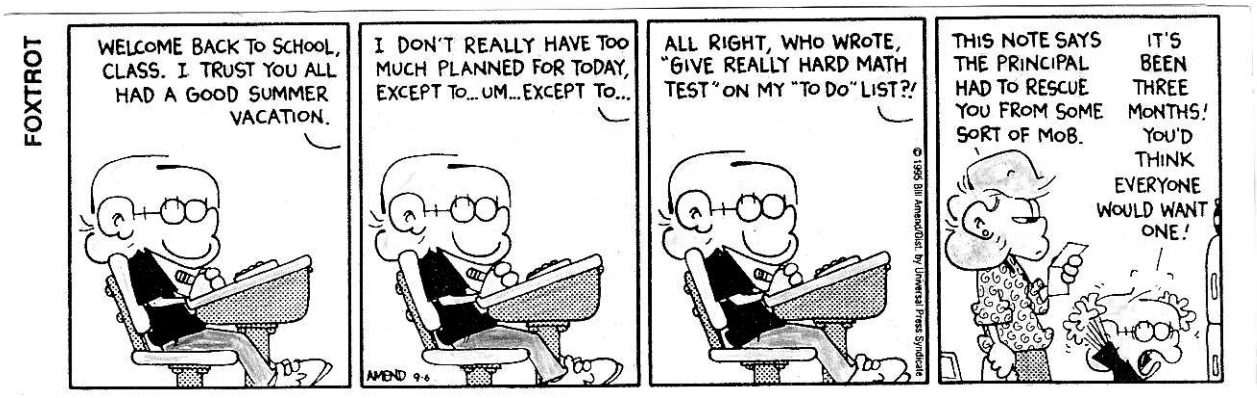
"An Aggie does not lie, cheat, or steal or tolerate those who do"
On my honor as an Aggie, I have neither given nor received unauthorized aid on this exam.

Printed name:_____

Signature:_____

Today my seat is: Row:_____ Seat number:_____

Usually my seat is: Row:_____ Seat number:_____



- You may use your calculators, but they must be cleared of all programs before beginning this exam.
- You may not use your book or notes on this exam.
- You may not collaborate with your neighbors on this exam.
- There is no partial credit on the multiple choice or true/false questions.
- You must show all appropriate work to receive credit (especially partial credit) on the work-out problems.
- The instructor will provide additional scratch paper if needed.
- Read each question carefully.
- Write your answers to 3 significant figures if appropriate.
- SCHOLASTIC DISHONESTY WILL NOT BE TOLERATED.

Problems 1-8 are worth 4 points each. Mark your answers on your exam as well as on your scantron.

1. Which of these are continuous random variables?
   X: the number of coin flips before heads occurs
   Y: the height in inches of a male residing in College Station, TX
   Z: the gas mileage of cars registered in the state of TX

   a) only X b) only Y c) only X and Y d) only X and Z
   e) only Y and Z

2. What is the number of distinguishable permutations of the letters in the word "studious"?

   a) 40320 b) 720 c) 20160 d) 10080 e) none of these

3. What is the probability of exactly 3 successes in 5 Bernoulli trials where the probability of failure is 0.3?

   a) 0.3087 b) 0.1323 c) 0 d) 0.4718 e) 0.9692

4. At a restaurant you may order from 9 beverages, 4 salads, 5 soups, 12 entrees, and 7 desserts. You may also decline to order any of the items listed. Calculate how many meals you can order. In your calculation you should include possibilities like the *starvation special* of ordering no drink, no salad, no soup, no entree and no dessert, or ordering only a drink, soup and a salad, but no entree and no dessert.

   a) 31200 b) 15140 c) 435897 d) 483840 e) none of these

5. If the mean of a probability distribution is 50 and its standard deviation is 6, what is the minimum probability that an observation sampled from this distribution falls between 38 and 62?

   a) 0.889 b) 0.954 c) 0.0455 d) 0.750 e) none of these

6. You pay \$2 to play a game of chance where you have a 1/25 chance of winning. If you win, you receive \$25; if you lose, you get nothing. What is your expected return from the game?

   a) \$1 b) \$1.50 c) $-$\$1 d) $-$\$1.50 e) none of these

7. What is the **sample** standard deviation for $\{10, 11, 11, 12, 13, 14, 15, 15\}$

   a) 1.80 b) 1.92 c) 1301 d) 12.6 e) none of these

8. What is the mode of the data in the following frequency table:

r.v. X	10	11	12	13	14	15
Frequency	1	2	1	2	1	2

a) 13 and 15 b) 1 and 2 c) 11 and 13 d) 11 and 13 and 15 e) no mode

On the back of your scantron mark A for TRUE and B for FALSE. Mark your answers on your test as well as on the back of your scantron.

The True/False questions are worth 2 points each.

51. a) TRUE b) FALSE If $X = \text{invnorm}(\mathcal{A})$ then $\mathcal{A}$ is the area under the standard normal probability density function to the right of X.

52. a) TRUE b) FALSE Bernoulli trials have two outcomes and repeated trials are independent.

53. a) TRUE b) FALSE normcdf$(5, 10, 7, 3)$ calculates the probability of a random variable X being between 7 and 3 when it is selected from a normal distribution with mean 5 and standard deviation 10.

54. a) TRUE b) FALSE $C(7, 3)$ calculates the number of arrangements of 3 objects taken from a set of 7 distinct objects.

55. a) TRUE b) FALSE The sum of all the areas in a histogram for a probability distribution is 1.

56. a) TRUE b) FALSE The mean of a sample is always the same as the mean of the population from which it is selected.

57. a) TRUE b) FALSE The standard deviation of a sample is equal to the square of the variance.

58. a) TRUE b) FALSE Let X be a random variable for the total monetary value of any two US coins. This random variable is finite discrete.

Show your work on the following problems. Write your answers to 3 significant figures.

1. A half-deck of cards is made up of only the hearts and clubs from the standard deck of 52 cards. Three cards are drawn without replacement from the 26 cards in the half-deck.

   a. (2 points) How many arrangements of three cards chosen from the half-deck of cards are possible?

   b. (2 points) How many subsets of three cards can be drawn from the half-deck?

   c. (4 points) How many ways can three cards be drawn from the half-deck so as to get at most 2 cards that are red? Note hearts are red; clubs are black.

   d. (3 points) What is the probability that the three cards chosen will contain at most 2 red cards?

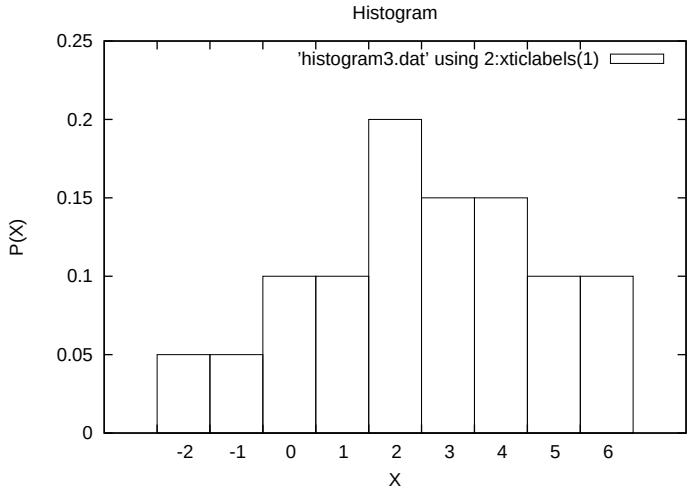
2. The mean amount of time it takes students to finish a math exam is 38.5 minutes, with a standard deviation of 7.5 minutes. Assume finishing time is normally distributed.

   a. (2 points) What percentage of students get done in 30 to 45 minutes?

   b. (2 points) What percentage of students will finish within 50 minutes?

   c. (3 points) 25% of students get done in more than how many minutes? Draw a picture showing what you are calculating.

3. Consider the probability distribution graphed in the following histogram



a. (3 points) **Shade** and **calculate** $P(-1 \leq X < 4)$ for the probability distribution graphed in the histogram.

b. (2 points) What is $P(X = 3)$ for this probability distribution?

c. (4 points) What is $E(X)$, the expected value, for this probability distribution

d. (4 points) What is $\sigma(X)$, the standard deviation, for this probability distribution?

e. (2 points) What is $\mathrm{Var}(X)$, the variance, for this probability distribution?

4. (8 points) A bag contains 3 red marbles, 8 blue marbles, 2 purple marbles and 1 green marble. Three marbles are drawn and the number of blue marbles in the sample are counted. Create a probability distribution for this experiment.

r.v. X	
$P(X)$	

5. The probability of manufacturing a defective iPod is 0.1%. (That is not 10% — that is one tenth of one percent!) Assume manufacturing errors are independent. 10,000 iPods are pulled aside before packaging and are tested every month.

   a. (2 point) Is this a repeated Bernoulli trial? Why or why not?

   a. (2 points) How many iPods do you expect to find defective from the 10,000?

   b. (3 points) What is the standard deviation of the number of defective iPods?

   c. (4 points) What is the probability of finding at least 5 to at most 15 defective iPods in the 10,000 tested?