# Math 493 Exam I October 4, '06

**Show enough work so that it is clear how you arrived at your answer.**
**You don't need to reduce your answers to decimal form.**

**Part I: Do four of five; 20 points each**

1. You roll two fair six-sided dice.

   (a) What is the probability that the sum of the faces showing is greater than 9?

   (b) What is the probability that the product of the faces showing is even?

2. A deck of 52 cards contains 4 aces. Players A, B, C, and D are each dealt 13 randomly selected cards.

   (a) What is the probability that player A will get all four aces?

   (b) What is the probability that some player will get all four aces?

   (c) What is the probability that each player will get one ace?

   (d) What is the probability that some two players get two aces each, the other two players no aces?

3. A continuous random variable $X$ has the density function

$$f(x) = \begin{cases} 0 & \text{if } x < 0 \\ cx^2 & \text{if } 0 \le x \le 3 \\ 0 & \text{if } 3 < x \end{cases}$$

   for a positive number $c$. Find:

   (a) $c$,

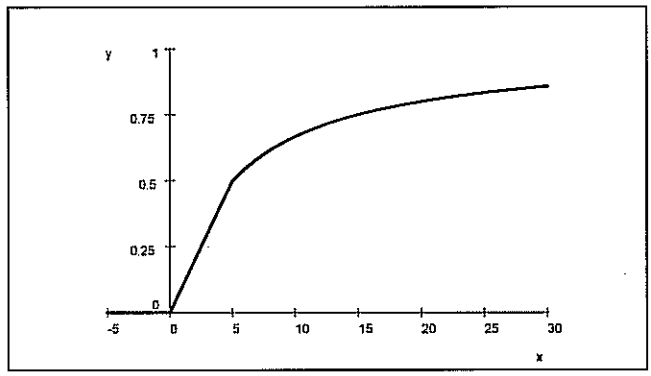
   (b) $\Pr(X > 2 | X > 1)$,

   (c) the median of $X$,

   (d) $F(1)$. ($F(x)$ is the distribution function of the random variable $X$.)

4. The pair of random variables $X, Y$ has a joint probability density function which is constant in the square with corners (-1,-1), (-1,1), (1,-1), and (1,1). What is $\Pr(X + Y < -1)$?

5. The distribution function of the random variable $X$ is given by the following graph. Estimate as best you can from the graph:




The distribution function of $X$

(a) $\Pr(X < -1)$

(b) $\Pr(X < 3)$

(c) $\Pr(2 < X < 8)$

(d) $\Pr(X = 8)$

(e) The median of $X$.

**Part II: Do two of three, 10 points each**

6. A jar contains 30 balls, 10 white, 10 red, 10 blue. You select three balls from the jar without replacement. What is the probability that your selection contains all three colors?

7. A box contains two dice, die $A$ with faces $1, 2, 3, 4, 5, 6$; die $B$ with faces $2, 2, 4, 4, 6, 6$. You reach in and select one of the dice and roll it.

   (a) What is the probability that the face that shows is a 2?

   (b) If you roll the die twice and the face that shows is 2, both times, what is the probability that the die you rolled is die $A$?

8. Each evening you go to one of the resturants $A, B, C$. You select the resturant at random according to the following rule. You go to the same resturant as the previous evening with probability .2 and each of the others with probability .4. Today you go to resturant $A$.

   (a) What is the probability that you go to resturant $A$ on Friday, the day after tommorow?

   (b) What is the probability that you to to resturant $C$ on Friday?

   (c) What is the probability that the resturant you go to next Wednesday, the $11^{th}$ will be the same as the one you go to next Friday, the $13^{th}$?