Math 498
Quiz 1

You should use the inside front cover of the textbook as a cheat sheet. You also should use the tables in the back of the textbook.

Justify all answers with neat and organized work. Clearly indicate your answers. 40 points possible.

1. (10 pts.) Let X_1 and X_2 be independent random variables with p.d.f.'s $f_1(x_1) = \frac{1}{8}x_1$, $0 < x_1 < 4$, and $f_2(x_2) = \frac{1}{9}x^2$, $0 < x_2 < 3$, respectively. Compute

(a) $P(1 < X_1 < 3 \text{ and } 1 < X_2 < 2)$.

(b) $E[X_1^3 X_2^2]$.

2. (10 pts.) Let X_1 and X_2 be two independent random variables with respective means 6 and 9 and variances 25 and 16. Compute the mean and variance of $Y = -3X_1 + 2X_2$.

3. (10 pts.) Suppose X is Poisson with $\mu_X = \lambda_X = 4$, Y is Poisson with $\mu_Y = \lambda_Y = 10$, and X and Y are independent. Find the moment generating function of the sum $X + Y$. What is the distribution of $X + Y$?

4. (10 pts.) A manufacturer has designed a four passenger compact car to carry a maximum safe load of 690 lbs. It is estimated that the weights of adult passengers are normally distributed about 150 lbs with a standard deviation of 20 lbs. What is the probability that 4 adult passengers will exceed the safe weight limits?