Math 362 **Exam 3** **Spring '11**

1. Consider the density function

$$f(x,y) = \begin{cases} 10x^2y & \text{for } 0 \le x \le 1,\ 0 \le y \le x, \\ 0 & \text{otherwise.} \end{cases}$$

Compute the following:

a) $f_1(x)$
b) $E(X)$
c) $V(X)$
d) $E(Y)$
e) $V(Y)$
f) $E(XY)$
g) $\mathrm{Cov}(X,Y)$
h) $\rho(X,Y)$
i) $E(Y|X)$
j) $V(2X-3Y)$.
k) What is the density function for $U = Y - X$?
l) Are X and Y independent? Give a reason.

2. Let X have density function

$$f(x) = \begin{cases} 5x^4 & 0 \le x \le 1, \\ 0 & \text{otherwise.} \end{cases}$$

What is the density function for X^3?

3. What is the moment generating function of $5X$, where X is a normal distribution with mean 0 and standard deviation 3?