Probability Questions, Spring 2005 ID# _____

1. The joint PMF of the random variables X and Y is given by the following tabl e:

Y=3	c	c	3c
Y=2	2c	c	4c
Y=1	5c	0	3c
	X=1	X=2	X=3

Calculate E[XY | Y=3].

2. Two companies produce similar devices but the second company manufactures k times more devices per unit time than the first company. The probability that a device produced by the first company is defective is p. The probability that a device produced by the second company is defective is q. A randomly selected device is defective. What is the probability that it was produced by the second company?

3. Consider a random variable X with the density

$$f_X(x) = a/(e^{-x} + e^{x}).$$

Find the probability that two independent observations of this random variable will be both less than 1.

4. Let X and Y be two independent random variables, where X is a geometric random variable with the parameter p=1/2 and Y is a random variable with the moment generating function $M_Y(s) = c(3+4e^{2s}+2e^{3s})/(3-e^{s})$. Find var$(X-Y)$.