1. Suppose that the number of errors per page of a book has a Poisson distribution with parameter $\lambda = 0.12$. Also suppose that the expected number of pages in a randomly selected new book is 400.

Find the expected number of errors in a randomly selected new book.
2. Consider a man and a woman who arrive at a certain location; whoever arrives first will wait for the other to arrive. If $X$ and $Y$ denote (respectively) the arrival times of the man and the woman after noon, in minutes, assume that $X$ and $Y$ are independent and each uniformly distributed on $[0, 60]$. (In other words, the man and woman arrive independently, at uniform times between noon and 1 PM.)

If the woman arrives at 12:35 PM, find the expected time spent waiting, i.e., find

$$E[|X - Y| \mid Y = 35].$$

Hint: Since we know that $Y = 35$, we may as well just substitute “35” for $Y$, so that we only have $X$’s in our lives. So we just need to find

$$E[|X - 35|].$$
3. A child rolls a pair of dice, one of which is blue and one of which is red. Given that the sum of the dice is 8, find the probability that the red die shows the value 4.

Now the child rolls a pair of die that look the same (i.e., which are not painted). Given that the sum of the dice is 8, find the probability that both of the dice simultaneous show the value 4.

Are your answers the same or different in the two parts above? Why?
4. As in Question 4 on Problem Set 27 and in Question 4 on Problem Set 28, assume that the height (in inches) of an American female is normal with expected value $\mu_1 = 64$ and standard deviation $\sigma_1 = 12.8$. Also assume that the height of an American male is normal with expected value $\mu_2 = 70$ and standard deviation $\sigma_2 = 14.0$. Let $X$ denote the female’s height and $Y$ denote the male’s height.

A man and a woman are chosen at random. The woman’s height is measured, and she is found to be exactly 63.2 inches tall. How much taller do we expect the man to be (as compared to this particular woman)? In other words, find $E[Y - X \mid X = 63.2]$. Hint: It might be easier to just go ahead and substitute 63.2 for $X$, and find $E[Y - 63.2]$.
Review question: 5. Suppose that 25 children select milk in a cafeteria. There are 70 milks available, with 30 that are chocolate, 25 that are whole milk, and 15 that are fat free. The children select their milk independently, and without replacement; all possible outcomes are equally likely. Let $X_j$ be a Bernoulli random variable that indicates whether or not the $j$th child got chocolate milk. Thus $X = X_1 + \cdots + X_{25}$ is the total number of children who got chocolate milk. Find the variance of $X$. 
6. Consider your own scenario, in which $X$ and $Y$ are dependent random variables (either discrete or continuous; either type is OK).

Find the expected value of $X$, given that $Y = y$. In other words, find $E[X \mid Y = y]$. 