Math 425 – Homework 8

Provide full solutions to each of the following problems. You may work with others, but you should submit your own solutions. If you use any source other than your textbook, you must cite that source. This homework set is due in class on Friday March 20, 2015.

Question 1
The density function of $X$ is given by

$$f(x) = \begin{cases} 
a + bx^2, & 0 \leq x \leq 1 \\
0, & \text{otherwise}
\end{cases}$$

If $E[X] = 3/5$, find $a$, $b$. Then, find Var($X$).

Question 2
A bird lands on a power line of length $L$, naturally dividing the line into a shorter segment and a longer segment. Assuming that the bird’s choice of landing spot is random, find the probability that the ratio of the shorter to the longer segment is less than 1/3.

Question 3
Do problem 5.15 in your book.

Question 4
Do problem 5.18 in your book.

Question 5
Do problem 5.20 in your book.

Question 6
Twenty percent of households in a town include a dog. Approximate the probability that there are at least 50 households with dogs on a street of 170 houses. What assumptions are you making to answer this problem?

Question 7
Do theoretical exercise 5.11 in your book.

Question 8
Suppose that the travel time from your apartment to your Math 425 class is normally distributed with mean 17 and standard deviation 5. If you want to be 90% sure that you won’t be late for a quiz at the beginning of class, what is the latest time that you should leave home?