PR Case 05

1. A private pilot wishes to insure his airplane for $200,000. The insurance company estimates that a total loss may occur with probability 0.002, a 50% loss with probability 0.01, and a 25% loss with probability 0.1. Ignoring all other partial losses, what premium should the insurance company charge each year to realize an average profit of $500?

2. In a gambling game a woman is paid $3 if she draws a jack or a queen and $5 if she draws a king or an ace from an ordinary deck of 52 playing cards. If she draws any other card, she loses. How much should she pay to play if the game is fair?

3. Suppose that the probabilities are 0.4. 0.3, 0.2, and 0.1, respectively, that 0, 1, 2, or 3 power failures will strike a certain subdivision in any given year. Find the mean and variance of the random variable X representing the number of power failures striking this subdivision.

4. A random variable X has a mean 10 and a variance 4. Using Chebyshev's theorem, find
   (a) $P(|X - 10| \geq 3)$
   (b) $P(|X - 10| < 3)$
   (c) $P(5 < X < 15)$
   (d) the value of the constant c such that $P(|X - 10| \geq c) \leq 0.04$.

5. An electrical firm manufactures a 100-watt light bulb, which, according to specifications written on the package, has a mean life of 900 hours with a standard deviation of 50 hours. At most, what percentage of the bulbs fail to last even 700 hours? Assume that the distribution is symmetric about the mean. [Hint: Use Chebyshev's theorem.]