1. The annual rainfall in a certain area is normally distributed with mean 40 and standard deviation 4. What is the probability that starting with next year, it will take over 10 years before a year with annual rainfall over 50 occurs? What assumptions are you making?

2. Let X be a normal random variable with mean 5. If $P(X > 9) = .2$, what is var X?

3. Let $X \sim N(10, 36)$. Compute

   (a) $P(X > 5)$

   (b) $P(4 < X < 16)$

   (c) $P(X < 20)$

4. (a) A fire station is to be located along a road of length $0 < A < \infty$. Fires occur at points chosen uniformly on $(0, A)$, where should be the fire station located to minimize expected distance to the fire? That is, if $X \sim U(0, A)$ choose a so that $E|X - a|$ is minimized.

   (b) Now suppose that the length is infinite and fire occur at random points that are distributed exponentially with rate λ. Where should be the fire station located in this case? That is, if $Y \sim \text{Exp}(\lambda)$ choose a so that $E|Y - a|$ is minimized.

5. Let X be exponential random variable with mean $1/\lambda$. Find EX^k.

6. Show $\Gamma(1/2) = \sqrt{\pi}$.

7. Let X be a random variable that takes values in $[0, c]$, i.e., $P(0 \leq X \leq c) = 1$. Show var $X \leq \frac{c^2}{4}$. (Hint: $EX^2 \leq cEX$.)