Fundamental Concepts of Statistics

Exercise session 3

1. Find expressions for the approximate mean and variance of $Y = g(X)$ with $g(x) = \log x$

2. If X is uniformly distributed on $[10, 20]$ find the approximate and exact mean and variance of $1/X$ and compare them.

3. Find the approximate mean and variance of $Y = \sqrt{X}$ when X is a random variable following a Poisson distribution with mean λ.

4. If X is distributed as $\mathcal{N}(75, 100)$, find $P(X < 60)$ and $P(70 < X < 100)$.

5. If X is distributed as $\mathcal{N}(\mu, \sigma^2)$, find b such that $P\left(-b < \frac{X-\mu}{\sigma} < b\right) = 0.90$.

6. If X is distributed as $\mathcal{N}(\mu, \sigma^2)$ so that $P(X < 89) = 0.90$ and $P(X < 94) = 0.95$, find μ and σ^2.

7. If X is distributed as $\mathcal{N}(5, 10)$, find $P(0.04 < (X - 5)^2 < 38.4)$.

8. If X is distributed as $\mathcal{N}(1, 4)$, find $P(1 < X^2 < 9)$.

9. If X is distributed as $\mathcal{N}(\mu, \sigma^2)$, show that $E[|X - \mu|] = \sigma\sqrt{2/\pi}$.