Assignment 11

Due on Monday, Oct 5th, 2020 by 11:30 AM

1. A pair $p, q$ has a maximum if and only if $p = q = 0.5$.

2. The probability density function $f(x)$ is defined as

$$f(x) = \begin{cases} 0 & x < 0 \\ \frac{1}{2} & 0 \leq x < 1 \\ 0 & x \geq 1 \end{cases}$$

3. Let $X_1, X_2, \ldots, X_n$ be independent uniformly distributed random variables with mean $\mu$ and variance $\sigma^2$. Thus, $X_i \sim U(\mu, \mu + \sigma^2)$.

4. Given a random variable $X$ with the probability density function $f_X(x)$, let $Y = \frac{X}{c}$ for some constant $c > 0$.

5. Consider the random variable $X$ with the probability density function $f_X(x)$ and mean $\mu$. The variance $\sigma^2$ of the random variable is given by:

$$\sigma^2 = \int (x - \mu)^2 f_X(x) dx$$

6. For the standard Poisson, the values of the Poisson parameter $\lambda$ is given by:

$$\lambda = \frac{1}{\mu^2}$$

7. For a random variable $X$ with an exponential distribution, the expected value $E(X)$ is given by:

$$E(X) = \frac{1}{\lambda}$$

8. Consider the random variable $X$ which is uniformly distributed on the interval $[a, b]$. The distribution of $X$ is given by:

$$f_X(x) = \begin{cases} \frac{1}{b-a} & a \leq x \leq b \\ 0 & \text{otherwise} \end{cases}$$

9. The Poisson distribution with parameter $\lambda$ is given by:

$$P(X = k) = \frac{e^{-\lambda} \lambda^k}{k!}$$

10. The binomial distribution with parameters $n$ and $p$ is given by:

$$P(X = k) = \binom{n}{k} p^k (1-p)^{n-k}$$

11. The normal distribution with mean $\mu$ and variance $\sigma^2$ is given by:

$$f(x) = \frac{1}{\sqrt{2\pi\sigma^2}} e^{-\frac{(x-\mu)^2}{2\sigma^2}}$$

12. The t-distribution with $\nu$ degrees of freedom is given by:

$$f(t) = \frac{\Gamma\left(\frac{\nu+1}{2}\right)}{\sqrt{\nu\pi}\Gamma\left(\frac{\nu}{2}\right)} \left(1 + \frac{t^2}{\nu}\right)^{-\frac{\nu+1}{2}}$$

13. The chi-square distribution with $k$ degrees of freedom is given by:

$$f(x) = \frac{x^{(k/2)-1} e^{-x/2}}{2^{k/2} \Gamma(k/2)}$$