

ELEG 5693 Assignment # 2

1. The pdf of the exponential RV is $f(x) = \frac{1}{u} \exp\left(-\frac{x}{u}\right)$, for $x > 0$, and $f(x) = 0$ otherwise. Find the mean and variance of X .
2. Find the mean of the RV X with pdf $f(x) = \frac{1}{\sqrt{2\pi}\sigma} \exp\left\{-\frac{(x-m)^2}{2\sigma^2}\right\}$. Show the procedures.
3. The joint pdf of (X, Y) is $f(x, y) = \exp(-y)$, for $0 < x < y$, and $f(x, y) = 0$ otherwise.
 - (a) Find $f(x)$
 - (b) Find $f(y)$
 - (c) Are they independent?
 - (d) Are they correlated?
 - (e) Find $f(x|y)$.
4. X and Y are two independent Gaussian RVs with mean μ and variance σ^2 , *i.e.*, $X \sim N(\mu, \sigma^2)$, $Y \sim N(\mu, \sigma^2)$. Find the correlation between $Z_1 = \alpha X + \beta Y$ and $Z_2 = \alpha X - \beta Y$.
5. If 20Mhz of total spectrum is allocated for a FDD wireless cellular system and each simplex channel has 25KHz bandwidth, find:
 - (a) the number of duplex channels
 - (b) the total number of channels per cell site, if $N = 12$ cell reuse is used.
 - (c) what is the reuse factor?