



CCE Proficiency – 2018

## Basics of Data Analytics – Fundamentals

### Study Assignment 2 (No need to submit)

$$\text{Variance} = E(X - E(X))^2$$

If mean of a random variable is zero, its second moment will give the variance. If  $[X - E(X)]$  can be considered as another random variable, say  $Y$ , the second moment of  $Y$  = variance.

Prove the following:

1. If  $c$  = constant,  $E(c) = c$
2. If  $c$  = constant,  $E(c \cdot x) = c \cdot E(x)$
3. If  $x$  = Random variable,  $y = h(x)$ ,

$$E(y) = E(h(x)) = \int_{-\infty}^{\infty} h(x)f(x)dx$$

Where,  $f(x)$  = density function of  $y$ .

4. For, two independent random variable  $x$  &  $y$ ,
  - 4.1.  $E(x \cdot y) = E(x) \cdot E(y)$
  - 4.2.  $E(x + y) = E(x) + E(y)$
5. Variance =  $V(x) = E(x^2) - [E(x)]^2$
6.  $V(x + c) = V(x)$ , where  $c$  = constant
7.  $V(c \cdot x) = c^2 \cdot V(x)$ , where  $c$  = constant
8. If  $x$  &  $y$  are independent random variables,  $V(x + y) = V(x) + V(y)$
9.  $\rho_{xy} = \frac{E[(x - E(x)) \cdot (y - E(y))]}{\sqrt{V(x) \cdot V(y)}}$ , for two random variables  $x$  &  $y$ .