

## CHAPTER FOUR

### CONTINUOUS RANDOM VARIABLES

#### 4.0 Introduction

The concept of continuous variables is explained at the beginning. The functions of probability, cumulative, normal, standard normal and also standardizing a normal distributions are discussed. The expected value and variance are also discussed in detail.

#### 4.1 The Rules

Probability function for continuous random variables should fulfill the rules below:

- i)  $f(x) \geq 0$ , for all  $x$  in the interval  $a \leq x \leq b$
- ii)  $\int_a^b f(x)dx = 1$ , for all  $x$  in the interval  $a \leq x \leq b$

For an event  $c \leq x \leq d$  with  $a \leq c \leq d \leq b$ , its probability is given by:

$$P(c \leq x \leq d) = \int_c^d f(x)dx$$

#### 4.2 The mean and variance of a continuous probability distribution

The mean of a continuous probability contribution can be defined as expectation of  $X$ , and given by:

$$\mu = E(X) = \int x.f(x)dx$$

The variance of a continuous probability contribution is given by:

$$\sigma^2 = E(X^2) - \mu^2 \quad \text{where } E(X^2) = \int x^2.f(x)dx$$