**Module B.2: Basic Statistical Concepts**

**Homework 2 Solutions**

**Q 1. There are two factories that produce bulbs – factory A and B. The probability of a defective bulb out of factory A is 0.94 and that of one from factory B is 0.98. The net probability of a bulb being defective from a given pile is 0.93. 40% of the bulbs out of that pile are made in factory A and the rest in factory B. If a bulb out of that pile is found defective, what are the odds that it was manufactured in factory A?**

Ans 1:

A: Event that the given bulb is produced in factory A

B: Event that the given bulb is produced in factory B

D: Event that the given bulb is defective.

P(D|A) = 0.94

P(D|B) = 0.98

P(A) = 0.4

P(D) = 0.93

P(A|D) = P(D|A)\*P(A)/P(D) = (0.94\*0.4)/0.93 = **0.4043**

**Q 2. The probability distribution function *p(x)* for a Standard Normal random variable *x (µ = 0, σ = 1)* is –**

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**Find the probability that the variable *x = 0.29.***

Ans 2:

*p(x) = exp(-0.5\*(x - μ)^2/σ^2)/σ√2π*

*p(x = 0.29, µ = 0, σ = 1) = exp(-0.5\*(0.29-0/1)^2)/1\*√2π*

*p(x = 0.29, µ = 0, σ = 1) = exp(-0.5\*0.29\*0.29)/2.5066*

*p(x = 0.29, µ = 0, σ = 1) = exp(-0.042)/2.5066*

*p(x = 0.29, µ = 0, σ = 1) = 0.9589/2.5066*

***p(x = 0.29, µ = 0, σ = 1) = 0.3826***