Mathematics for Information Science - 3

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1 Experiment & Subspace

An experiment is any activity or process whose outcomes are subject to uncertainty.
Sample space denoted by S is the set of all outcomes of that experiment.

2 Random Variable

A random variable is a function whose domain is the sample space, S and whose range is the set if real number R.
Random variable,

$$rv : S \to R$$

There are 2 types of random variables:

1. Discrete random variable: Whose values constitute a countable set
2. Continous random variable

3 Propability distribution/Propability Mass Function (PMF)

PMF of a discrete random variable is defined for every number, x by:

$$p(x) = p(X = x)$$

Satisfying the following conditions:

1. $p(x) \geq 0$
2. $\sum p(x) = 1$

NB: Propability can never be > 1
Q. Check whether the following are PMF

$$P(x) = \frac{x^2}{25}; x = 0, 1, 2, 3, 4$$

A.

$$P(0) = \frac{0^2}{25} = 0$$
$$P(1) = 1/25$$
$$P(2) = 4/25$$
$$P(3) = 9/25$$
$$P(4) = 16/25$$
$$P(0) + P(1) + P(2) + P(3) + P(4) = \frac{30}{25} \neq 1$$

Therefore, $P(x)$ can't be a PMF