Assignment 5: Papoullis Text Book

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Outline

Question

Example 2.7

A telephone call occurs at random in the interval (0, T). This means that the probability that it will occur in the interval $0 \leq t \leq to$ equals $\frac{to}{T}$. Thus the outcomes of this experiment are all points in the interval (0, T) and the probability of the event {the call will occur in the interval (t1,t2)} equals

Solution

Given,
probability that it will occur in the interval $0 \leq t \leq to = \frac{to}{T}$. we know that

$$\int_0^{to} \alpha(t)\, dt = \frac{to}{T} \tag{2.0.1}$$

as we know that it is linear random variable $\alpha(t)$ is constant by taking $\alpha(t)$ as α

$$\alpha \times (to - 0) = \frac{to}{T} \tag{2.0.2}$$

$$\implies \alpha = \frac{1}{T} \tag{2.0.3}$$

So,

$$P\{t1 \leq t \leq t2\} = \int_{t1}^{t2} \alpha(t)\, dt \tag{2.0.4}$$

$$= \alpha \times (t2 - t1) \tag{2.0.5}$$

$$= \frac{1}{T} \times (t2 - t1) \tag{2.0.6}$$

$$= \frac{t2 - t1}{T} \tag{2.0.7}$$

Thus the outcomes of this experiment are all points in the interval (0, T) and the probability of the event {the call will occur in the interval (t1,t2)} equals $\frac{t2-t1}{T}$