

Assignment 7

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Abstract—This document contains the solution for Assignment 7 (Papulous Example 26)

Ex 26 A radioactive substance is selected at $t = 0$ and the time t of emission of a particle is observed. This process defines an experiment whose, outcomes are all points on the positive t axis. This experiment can be considered as a special case of the real line experiment if we assume that S is the entire t axis and all events on the negative axis have zero probability. Suppose the function $\alpha(t)$ is the pdf of the probability that a particle will be emitted at t . Calculate the probability that a particle will be emitted in the time interval $(0, t_0)$.

$$\alpha(t) = ce^{-ct} \quad U(t) = \begin{cases} 1 & t \geq 0 \\ 0 & t < 0 \end{cases} \quad (1)$$

Solution: Let the random variable t be the time at which a particle is emitted. From the given PDF we can calculate the probability as

$$\Pr(0 < t < t_0) = \int_0^{t_0} ce^{-ct} U(t) dt \quad (2)$$

$$= \int_0^{t_0} ce^{-ct} dt \quad (3)$$

$$= c \int_0^{t_0} e^{-ct} dt \quad (4)$$

$$= 1 - e^{-ct_0} \quad (5)$$

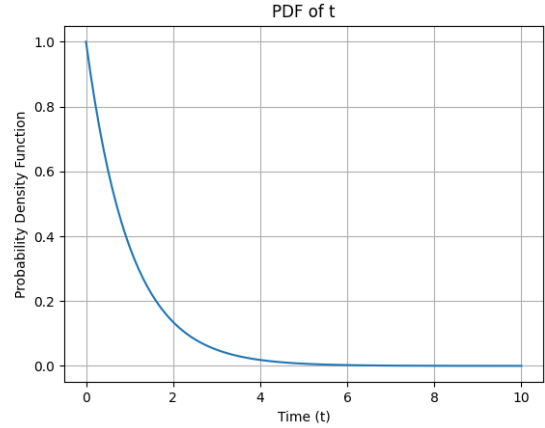


Fig. 0. PDF Of T