2021-09-07

Questions

Q1.

Consider the experiment in which we record $M(t)$, the number of active calls at a telephone switch at time t, for each second over an interval of 15 minutes. Determine the state space and the index set of the stochastic process $\{M(t) : t \geq 0\}$

Answer State space $S_X = \{0, 1, 2, ..., 900\}$
Index set $T_X = \{0, 1, 2, ...\}$

Q2.

6 green balls and 4 white balls are placed in two boxes A and B such that each box has 5 balls. At each stage, a ball is drawn at random from each box and two balls are interchanged.

(a) Let X_n denote the number of white balls in box A after the nth draw. Find the state space and the index set of the stochastic process $\{X_n\}$

(b) Let Y_n denote the number of green balls in box A after the nth draw. Find the state space and the index set of the stochastic process $\{Y_n\}$

Answer

part (a) State space $S_X = \{0, 1, 2, 3, 4\}$
Index set $T_X = \{0, 1, 2, ...\}$

part (b) State space $S_Y = \{0, 1, 2, 3, 4, 5\}$
Index set $T_Y = \{0, 1, 2, ...\}$