

Exercise 23 (8/1/98 ex..3)

A company has a production line with a critical component. If the component fails it will be replaced immediately alternatively it will be replaced when it has been in use in time T . We will choose the time unit to be equal to this time i.e. $T = 1$. It can be assumed that the lifetime of a component in the interval $]0; T]$ can be adequately described by an exponential distribution with mean value 1.

Question 1

Determine the probability that a component fails before the time $t = T = 1$.

There is a second supplier which can supply the critical component. The company now decides on a policy where the supplier will be changed whenever a component fails but the supplier will not be changed if the component is replaced at time T . The life time of components from the other supplier can be adequately described by an exponential distribution with mean value $\frac{3}{2}$ in the interval $]0; 2]$.

Question 2

Determine the fraction of components installed from the first supplier.

Question 3

Formulate a stochastic model describing the successive installations of new components.

Question 4

Give the (long run) fraction of time a unit of the first supplier is in use.