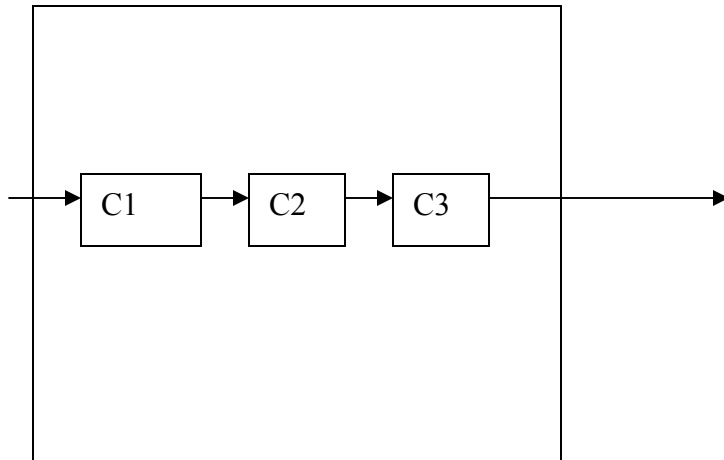


Probability Theory and Applications – In class Assignment

We have a machine with 3 sequential components. The machine will function as long as all of the three components functions work. Equivalently the machine will fail when any one of the machines fails. The time to failure of each of the components is exponential with mean of 1 year? Assume the failures of the components are independent? How long will the machine work?



Let C_1 , C_2 , and C_3 be random variables representing the time to failure of each component. Let X be a random variable representing the time to failure of the machine. Express X as a function of C_1 , C_2 , C_3 .

If X lasts more than a half year, can any of the components last less that a half year?

If X last greater than x year(s), what can you say about the time to failure of the each of the components?

Compete the following

$$P(X \geq x) = P(C_1 > \quad , C_2 > \quad , C_3 > \quad)$$

Express the cdf of X , as a function of the cdf 's of C_1, C_2, C_3 . Hint find $P(X > x)$ in terms of $P(C_i > x)$ and then convert.

What is the pdf of X ?