

HW21 due Tues June 1

Topics: Reliability function, hazard rate

1. Suppose that a component has a lifetime (in hours) that is uniformly distributed on the interval $(0, 100)$.

a) Determine and graph the reliability function of this component.

b) Calculate and interpret the reliability at time $t = 50$.

c) Now suppose that two such components, whose lifetimes are independent, are connected in series. Determine and graph the reliability function of this system.

d) Now suppose that two such components, whose lifetimes are independent, are connected in parallel. Determine and graph the reliability function of this system.

e) Calculate the reliability of both systems at time $t = 50$. Comment on how these compare to each other and to your answer to b).

f) Now suppose that 3 components are connected in such a way that the system functions only if component 1 functions and either component 2 or component 3 functions. Determine the reliability function of this system. Be sure to show and explain the steps in your derivation.

2. Suppose that a system has hazard rate $h(t) = e^t$, $t > 0$.

a) Graph this hazard rate function, for $0 < t < 3$.

b) Is this hazard rate increasing or decreasing? Comment on what this reveals about the system.

c) Determine and graph the reliability function of the system.

d) Determine and graph the pdf of the lifetime T of the system.

e) Determine the probability that the system is still functioning at time $t = 1$. Indicate how you could use either the reliability function or the pdf to calculate this probability.