Applied Stochastic Models (SS 09)
Problem Set 6

Problem 1
(a) Write the structure function corresponding to a system consisting of four components in such a way that the system functions if and only if components 1 and 2 both function and at least one of components 3 and 4 function. Find the minimal path sets and minimal cut sets of this system.
(b) Work the above problem for a system with six components which functions if and only if components 1 and 6 both function, and at either 2 and 4 both function or 3 and 5 both function.

Problem 2
(a) The minimal path sets of a system are \{1, 2, 4\}, \{1, 3, 5\}, and \{5, 6\}. Find the minimal cut sets.
(b) The minimal cut sets of a system are \{1, 2, 3\}, \{2, 3, 4\}, and \{3, 5\}. Find the minimal path sets.

Problem 3
(a) Find the reliability function \( r \) of a 2-out-of-4 system with independent components. If the reliabilities of the components are all equal to 0.2, find \( r(0.2) \).
(b) Find the reliability function of a bridge system with independent components. If the reliabilities of the components are all equal to 0.2, find \( r(0.2) \).

Problem 4
(a) Consider a parallel system with identical components each with reliability 0.8. If the reliability of the system is to be at least 0.99, find the minimum number of components in this system.
(b) Consider a series system with identical components each with reliability 0.8. If the reliability of the system is to be at least 0.5, find the maximum number of components in this system.