

## Applied Stochastic Models (SS 08)

### 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.