Question 18 **(9 marks)**

A building has five alarms configured in such a way that the system functions if at least two of the alarms work. The probability that an alarm fails overnight is 0.05. Let the random variable X denote the number of alarms that fail overnight.

(a) State the distribution of X. (2 marks)

(b) What assumptions are required for the distribution in part (a) to be valid? (2 marks)

(c) What is the probability that the alarm system fails overnight? (2 marks)

One of the alarms is removed in the evening for maintenance and is not replaced.

(d) What is the probability that the alarm system still works in the morning? (3 marks)