Problem 8.43 The probability that an event occurs at least once in four independent trials is equal to 0.59. What is the probability of occurrence of the event in one trial, if the probabilities are equal in all trials?

Solution

The probability that the event occurs on a least one trial is 1 minus the probability that the event does not occur at all. Let p be the probability of occurrence on a single trial, so 1-p is the probability of not occurring on a single trial. Then

$$\mathbf{P}[\text{at least one occurence}] = 1 - (1 - p)^4$$
$$0.59 = 1 - (1 - p)^4$$

Solving for p gives a probability on a single trial of 0.20.