IMM - DTU

02405 Probability
2003-10-15
BFN/bfn

Solution for review exercise 20 (chapter 2) in Pitman

We define the events Bi that exactly i bits are transmitted correctly and the event W that a word is transmitted correctly.

Question a) We can express the event W in terms of the Bi's by $W = \cup_{i=n-k}^{n} Bi$. The events Bi are mutually exclusive such that using the addition rule page 21 we get

$$P(W) = P\left(\cup_{i=n-k}^{n} Bi\right) = \sum_{i=n-k}^{n} P(Bi)$$

Now the probabilities $P(Bi)$ are given by the Binomial distribution page 81 and page 479, so

$$P(W) = \sum_{i=n-k}^{n} \left(\begin{array}{c} n \\ i \end{array} \right) p^i (1-p)^{n-i}$$

Question b)

$$P(W) = 0.99^8 \left((1 + 8\frac{0.01}{0.99} \left(1 + \frac{7}{2}\frac{0.01}{0.99} \right) \right) = 0.999946$$