Problem 8.1 An information packet contains 200 bits. This packet is transmitted over a communications channel where the probability of error for each bit is 10^{-3}. What is the probability that the packet is received error-free?

Solution

Recognizing that the number of errors has a binomial distribution over the sequence of 200 bits, let x represent the number of errors with $p = 0.001$ and $n = 200$. Then the probability of no errors is

$$\begin{aligned} \mathbf{P}\left[\mathrm{x}=0\right] &= (1-p)^{n} \\ &= (1-.001)^{200} \\ &= .999^{200} \\ &= 0.82 \end{aligned}$$