**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

$$\mathbf{P} [\mathbf{x} = 0] = (1 - p)^n$$
  
= (1 - .001)<sup>200</sup>  
= .999<sup>200</sup>  
= 0.82

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