Consider the bitstream ...0110111... taken from the bitstream 0I10I110I110I111I. We

would decode the initial part incorrectly, then would synchronize. If we had a fxed- length code (say 00,01,10,11), the situation is much worse. Jumping into the middle leads to no synchronization at all!

###### Solution to Exercise 6.25.1

This question is equivalent to *3pe*×*(1 − pe)+p 2≤ 1 or 2p 2−3pe +1 ≥ 0*. Because this is an upward-going parabola, we need only check where its roots are. Using the quadratic formula, we fnd that they are located at

*e e*



and 1. Consequently in the range



the error rate produced by coding is smaller.

###### Solution to Exercise 6.26.1

With no coding, the average bit-error probability *p*e is given by the probability of error equation (6.47):



With a threefold repetition code, the bit-error probability is given by where

Plotting this reveals that the increase in bit-error probability out of the channel because of the energy reduction is not compensated by the repetition coding.