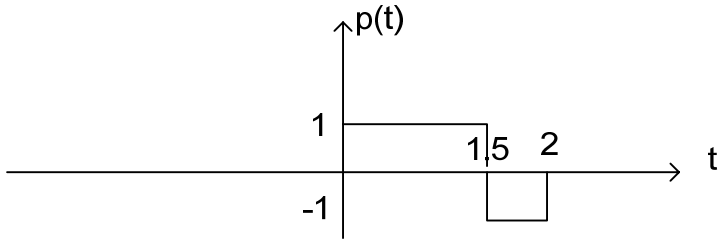
Concordia University
Department of Electrical and Computer Engineering
ELEC6831/ELEC462: Digital Transmission Systems
Midterm Exam
Winter 2012

1) A communication system consists of a source S a destination D and two repeaters R1 and R2. Data is transmitted from S to R1, from R1 to R2 and from R2 to D. If the probability of error on each link (S to R1, R1 to R2, and R2 to D) is 0.2 find the overall probability of error (from S to D) (5 Marks).

2) Find the matched filter for the following baseband pulse (2 Mark):



b) Find the output of the matched filter (3 Marks).

3) A communication system transmits over an AWGN channel with $\frac{N_0}{2} = 10^{-8}$ using binary PAM where 0 and 1 are represented by +A and -A, respectively. The channel bandwidth is 15 MHz. and the system uses a raised cosine filter with rolloff factor of 1.

a) What is the maximum bit rate that this channel can support? (2 Marks)

b) Find A such that the probability of error does not exceed 10^{-7} if the system transmits at the maximum bit rate possible. (5 Marks)

c) Assume that we set A=1.5 but insist on having a probability of error of 10^{-7}. What is the maximum possible bit rate? What fraction of the bandwidth is used? (3 Marks)