Name: _____ Student ID No: _____

UNIVERSITY OF CALIFORNIA

College of Engineering
Department of Electrical Engineering and
Computer Sciences

Professor Zeitouni Spring 1998

EECS 126 — MIDTERM #1

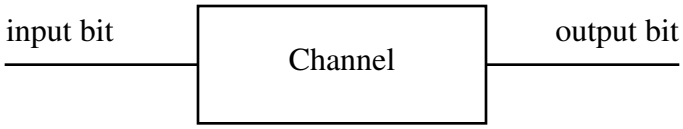
February 12, 1998, Thursday 8:10-9:10 a.m.

[20 pts.] 1. Given $P(A) = \alpha, P(B) = \beta$

$$P(A \cup B) = \gamma,$$

find $P(A|B^C)$.

[50 pts.] 2. Consider a communication channel as follows:



where $p(\text{output} = 1|\text{input} = 1) = 0.9$

$$p(\text{output} = 1|\text{input} = 0) = 0.05$$

The channel is fed with 5 independent Bermoulli bits, $P(\text{bit} = 1) = 0.2$.

Compute:

a) The probability that the output sequence does not equal the input sequence. (30 pts.)

b) The probability that the output sequence differs from the input sequence by more than one bit. (20 pts.)

[30 pts.] 3. Consider the channel in Problem 2, which is fed by a sequence of independent Bermoulli (0.5) bits.

Find the probability that the first mismatch between the input and output sequences occurs at the fifth bit.