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UNIVERSITY OF CALIFORNIA
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Department of Electrical Engineering and
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Spring 1998

EECS 126 — MIDTERM #1

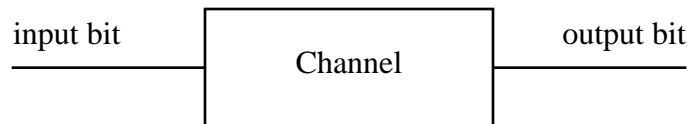
February 12, 1998, Thursday 8:10-9:10 a.m.

[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 Bernoulli 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 Bernoulli (0.5) bits.

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