True/False - No explanation needed. (For each: 1 point if correct, 0 points if not answered, -1 points if incorrect)

1. The statement

$$B_1 \cap B_2 \cap \ldots \cap B_n = \emptyset \text{ necessarily implies } B_i \cap B_j = \emptyset \text{ for every } 1 \leq i, j \leq n$$

   is false, but the implication in the opposite direction is true. True/False

2. $P(A|B)$ is at most $P(B)$, considering that in $P(A|B)$ we are assuming the occurrence of B. True/False

Problems - Needs justification.

1. A space probe near Neptune communicates with earth using bit strings. Suppose that in its transmissions it sends a 1 one-third of the time and a 0 two-thirds of the time. When a 0 is sent, the probability that it is received incorrectly (as a 1) is 0.1. When a 1 is sent, the probability that it is received correctly is 0.8, and the probability that it is received incorrectly (as a 0) is 0.2. What is the probability that a 0 was transmitted, given that a 0 was received. Give your answer as a fraction in reduced terms. (10 points)