Econometrics I

Fall 2000

Assignment 1

Today's Date: September 11
Due Date: September 18

Please show all of your work and clearly indicate your final response to each question.

1. If A and B are disjoint events, $P(A) = .4$, and $P(A \cup B) = .55$, what is $P(B)$?

2. One urn contains one black ball and one gold ball. A second urn contains one white and one gold ball. One ball is selected at random from each urn.

   (a) Write down the sample space for this experiment.
   (b) Write down the event space.
   (c) What is the probability that both balls will be of the same color?
   (d) What is the probability that one ball will be white?

3. If $P(A) = 1/3$ and $P(B^c) = 1/4$, can A and B be disjoint? Why?

4. Prove or disprove:

   (a) If A and B are independent events, then $P(AB|C) = P(A|C)P(B|C)$.
   (b) If $P(A|B) = P(B)$, then A and B are independent.
   (c) If $P(A|B) \geq P(A)$, then $P(B|A) \geq P(B)$
   (d) If $P(B|A^c) = P(B|A)$, then A and B are independent.
   (e) If $a = P(A)$ and $b = P(B)$, then $P(A|B) \geq (a + b - 1)/b$.

5. A single die is tossed; then n coins are tossed, where n is the number shown on the die. What is the probability of exactly two heads?

6. If $P(B) = P(A|B) = P(C|AB) = .5$, what is $P(ABC)$?

7. Given that $P(A) = .5$ and $P(A \cup B) = .6$, find $P(B)$ if:

   (a) A and B are mutually exclusive.

   (b) A and B are independent.

   (c) $P(A|B) = .4$.