Economics 501   Gallant

Homework 3   Fall 2014

Due Sept. 16

1. In a shipment of 1,000 transistors, 100 are defective. If 25 transistors are inspected, what is the probability that 5 of them will be defective. Be sure to include an explanation of the logic that you used to reach your answer.

2. Show that if two events A and B are independent, then so are A and $\tilde{B}$ and $\tilde{A}$ and $\tilde{B}$.

3. Assume that $P(A) > 0$ and $P(B) > 0$. Prove that if A and B are mutually exclusive, then they cannot be independent. Prove that if A and B are independent, then they cannot be mutually exclusive.

4. Compute the probability of a win for each of the place bets in craps. Work the problem two ways: (i) Compute the probability of the union of the events "win on roll i". (ii) Compute the probability of a win conditional on termination.

   You can use without proof the fact that the answers for the place bet on the 4 and 10 are the same; similarly for the 5 and 9, and 6 and 8.

5. Suppose that an urn contains n balls all of which are white except one which are red. The urn is thoroughly mixed and all the balls are drawn from the urn without replacement by a blindfolded individual. Show that the probability that the red ball will be drawn on the k-th draw is $1/n$.

6. Two people each toss a coin n times that lands heads with probability $1/3$. What is the probability that they will each have the same number of heads. What is the probability if the coin lands heads with probability $2/3$.