

AMS Common Qualifying Examination, Spring Semester 2008
Probability Questions for Statistics and Operations Research

1. Suppose that we have 3 cards identical in form except that both sides of the first card are colored red, both sides of the second card are colored black, and one side of the third card is colored red and the other side black. The 3 cards are mixed up in a hat, and 1 card is randomly selected and put down on the ground. If the upper side of the chosen card is colored red, what is the probability that the other side is colored black?

Probability Questions for Jan 2008

Let X be a random variable that takes on values between 0 and c . That is, $P\{0 \leq X \leq c\} = 1$, where c is a positive constant. Show that

$$\text{var}(X) \leq \frac{c^2}{4}.$$

Probability Questions for Jan 2008

2. Coin A is flipped at times 1,3,5,... and coin B is flipped at times 2,4,6,... . The probability that the outcome is TAIL is p_A for coin A and p_B for coin B. Let T be the number of the flip when the first TAIL is observed. Find ET .

Probability Questions for Jan 2008

3. Let X and Y be random variables with the joint cumulative distribution function $F_{X,Y}(x,y)$ defined by $F_{X,Y}(x,y) = \sin x \sin y$, where $0 \leq x, y \leq \pi/2$. Find $E[XY]$.