

Stat 200A, fall 2008
Homework 1: due Wednesday, September 10

#3, 5, 13, 14, 29, 34, 37, and 40 in HPS.

#3 Let a point be picked at random in the unit square. Compute the probability that it is in the triangle bounded by $x = 0$, $y = 0$, and $x + y = 1$.

#5 In Example 2 of Chapter 1 of HPS, compute the following probabilities:

- (a) No disintegration occurs before time 10.
- (b) There is a disintegration before time 2 or a disintegration between times 3 and 5.

#13 Suppose we have four chests each having two drawers. Chests 1 and 2 have a gold coin in one drawer and a silver coin in the other drawer. Chest 3 has two gold coins and chest 4 has two silver coins. A chest is selected at random and a drawer opened. It is found to contain a gold coin. Find the probability that the other drawer has:

- (a) a silver coin;
- (b) a gold coin.

#14 A box has 10 balls, 6 of which are black and 4 of which are white. Three balls are removed from the box, their color unnoted. Find the probability that a fourth ball removed from the box is white. Assume that the 10 balls are equally likely to be drawn from the box.

#29 Suppose there were a test for cancer with the property that 90% of those with cancer reacted positively whereas 5% of those without cancer react positively. Assume that 1% of the patients in a hospital have cancer. What is the probability that a patient selected at random who reacts positively to this test actually has cancer?

#34 Let A and B denote two independent events. Prove that A and B^c , A^c and B , and A^c and B^c are also independent.

#37 Experience shows that 20% of the people reserving tables at a certain restaurant never show up. If the restaurant has 50 tables and takes 52 reservations, what is the probability that it will be able to accommodate everyone?

#40 A certain component in a rocket engine fails 5% of the time when the engine is fired. To achieve greater reliability in the engine working, this component is duplicated n times. The engine then fails only if all of these n components fail. Assume the component failures are independent of each other. What is the smallest value of n that can be used to guarantee that the engine works 99% of the time?