Logistics and Transportation Planning
Homework 2
Due: Monday, October 4, 2004 In Class

(1) Suppose that z is the maximum of seven independent variables that are all uniform on (0,a). Use Crofton's method to determine E(z-squared) in terms of a.

(2) Problem 3.18

(3) Consider a square area of side 4, with (0,0) the lower left corner. A barrier extends from (0,1) to (4,1), with a break at (1,1) through which traffic can pass. Assume that an emergency is equally likely to arise at all points in the square, while the position of the response vehicle is uniformly distributed over the square and independent of the location of the emergency.

(i) Compared to having no barrier, what is the maximum additional travel distance (Manhattan metric) that the barrier could impose on the response vehicle?

(ii)What is the probability that the additional travel distance because of the barrier is greater than 5?

(iii)What is the mean additional travel distance for the response vehicle caused by the barrier?

(4) Problem 3.13

(5) In the sky-crossing example, what is the probability that an eastbound plane will be in conflict with exactly three northbound planes?

Given such a triple conflict, what is the probability that all three northbound planes are in conflict with one another? (HINT: Under the Poisson assumption, the locations of the three planes are independent and uniform over (-7.1, 7.1) when the eastbound plane passes through J.