

Math 302/Stat 302 Problem Set VIII

Due March 22

Problems from textbook

page 249 # 5.17, 5.18, 5.20, 5.22

page 253 # 5.26, 5.27, 5.31, 5.33

page 260 # 5.41, 5.42

Other Problems

- I) Suppose that A , B and C are independent random variables, each being uniformly distributed over the interval $0 < x < 1$. What is the probability that all roots of the equation $Ax^2 + Bx + C = 0$ are real?
- II) A farmer makes cuts at two points selected at random on a piece of lumber of length ℓ . What is the expected value of the length of the middle piece?
- III) The joint probability function $p(x, y)$ of the random variables X and Y is given by the following table. Determine if X and Y are independent.

	$y = 0$	$y = 1$	$y = 2$	$y = 3$
$x = 0$	0.1681	0.1804	0.0574	0.0041
$x = 1$	0.1804	0.1936	0.0616	0.0044
$x = 2$	0.0574	0.0616	0.0196	0.0014
$x = 3$	0.0041	0.0044	0.0014	0.0001

- IV) Let X and Y be independent exponential random variables, both with mean one. Find $E[\max(X, Y)]$.
- V) Customers arrive at a store according to a Poisson process. Let $N(t)$ be the number of customers that arrive from store opening (at time zero) to time t . Let $0 < x < y$.
- a) Find the conditional distribution of $N(x)$ given that $N(y) = n$.
- b) Find the conditional distribution of $N(y)$ given that $N(x) = n$.
- VI) Cards are drawn from an ordinary deck of 52, one at a time, randomly and with replacement. Let X and Y denote the number of draws until the first ace and first king are drawn, respectively. Find $E(X|Y = 5)$.

Midterm 2 is on Monday, March 13.

Exam is Thursday, April 13 at 8:30