

**Discussion 2**

Fall 2014

**Date:** Wednesday, September 10, 2014

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*Problem 1.* Suppose that a point  $(X, Y)$  is picked uniformly at random inside a circle of radius  $r$  centered at the origin. Find the conditional distribution  $f_{X|Y=y}$ .

*Problem 2.* Let  $X_1, X_2, \dots, X_n$  be i.i.d. continuous random variables distributed uniformly between 0 and 1.

- (a) Find  $E(X_1)$ .
- (b) Find  $var(X_1)$ .
- (c) Let  $X_{(1)}, X_{(2)}, \dots, X_{(n)}$  be the ordered random variables such that  $X_{(1)} \leq X_{(2)} \leq \dots \leq X_{(n)}$ . Find the marginal distributions of  $X_{(1)}$  and  $X_{(n)}$ .
- (d) Find the expected value of  $\min_i X_i = X_{(1)}$  and  $\max_i X_i = X_{(n)}$ . Can you do it without any calculations?
- (e) What is the joint distribution of  $(X_{(1)}, X_{(2)}, \dots, X_{(n)})$ ? Can you guess the answer without any calculations?