

HOMEWORK 7
STA320.01, Probability
Fall Semester, 2013

Due: Thurs Nov 7th 2013

- 1** Suppose that a point (X, Y) is chosen at random from the region S defined as

$$S = \{(x, y) | 0 \leq x \leq 2 \text{ and } 0 \leq y \leq 4\}.$$

- (a) Determine the joint p.d.f. of X and Y , the marginal p.d.f. of X and the marginal p.d.f. of Y .
(b) Are X and Y independent?

- 2** Suppose that a joint p.d.f. of X and Y is

$$f(x, y) = \begin{cases} 24xy & \text{for } x, y \geq 0 \text{ and } x + y \leq 1 \\ 0 & \text{otherwise.} \end{cases}$$

Are X and Y independent?

- 3** Suppose that the random variables X, Y, Z have the following joint pdf

$$f(x, y, z) = \begin{cases} 2 & \text{for } 0 < x < y < 1 \text{ and } 0 < z < 1, \\ 0 & \text{otherwise.} \end{cases}$$

Evaluate $P(3X > Y | 1 < 4Z < 2)$.

- 4** Compute the variance of a r.v. X which is distributed uniformly on $[0, 1]$.

- 5** Suppose X is a r.v. with $\mathbb{E}(X) = \mu$ and $\text{Var}(X) = \sigma^2$. Show that

$$\mathbb{E}[X(X - 1)] = \mu(\mu - 1) + \sigma^2.$$