

NAME: \_\_\_\_\_

1. Show that the function

$$f(x, y) = 4xy, \quad x, y \in [0, 1] \quad \text{and} \quad f(x, y) = 0 \quad \text{otherwise}$$

is a probability distribution function.

2. Show that the random variables  $X, Y$  with joint pdf given by  $f = f(x, y)$  in Problem 1 are independent.

3. Find (a)  $E(X - Y)$  and (b)  $V(X)$  in Problem 1.

4. Calculate  $V(X - Y)$  in Problem 1.

5. Find the conditional distributions  $f(x|y)$  and  $f(y|x)$  for the joint pdf

$$f(x, y) = x + y, \quad x, y \in [0, 1] \quad \text{and} \quad f(x, y) = 0 \quad \text{otherwise.}$$