ECE 361 HW8 due May 29

1. For the joint density given below, obtain the marginal densities? Are X and Y independent?

$$f(x,y) = \frac{1}{2a} e^{-\frac{y}{a}}, 1 < x < 3, 0 < y < \infty$$

2. The joint density of two variables X and Y is

$$f(x,y) = k\exp(-2x), 0 < y < x < \infty$$

Obtain the constant k and the marginal densities. What is the probability that 2Y>X?

3. The joint density of X and Y is given as

$$f(x,y) = K\exp\left(-\frac{x}{4} - \frac{y}{2}\right), 0 < y < x < \infty$$

Obtain the value of K and the pdf of Z=X+Y and W=X-Y

4. X and Y are independent and identically distributed Rayleigh variables. Obtain the pdf of $W = \frac{X}{Y}$. Using the pdf of W, obtain the pdf of $Z = \frac{X+Y}{Y}$. Verify that your answers are correct!

5. The joint density of X and Y is

$$f(x,y) = \frac{1}{\pi}, x^2 + y^2 \leq 1$$

Obtain the joint pdf of

$$Z = \sqrt{X^2 + Y^2}$$

$$W = \tan^{-}\left(\frac{Y}{X}\right)$$

Are Z and W independent? Provide the proof.

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