ASEN 5005-Statistical Orbit Determination
Homework 4

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1 Problem 1

Given the joint density function:

$$\begin{array}{cc} f(x,y) = k*(x^2+y^2) & 0<x<2, \quad 1 \leq y \leq 3 \\ f(x,y) = 0 & elsewhere \end{array}$$

Several insights were to be found.

1.1 1a-Find k

To find **k**, I employed the rule that any joint density function must be equal to one when integrated across the number range.

$$\int_{-\infty}^{\infty}\int_{-\infty}^{\infty} k*(x^2+y^2)dxdy = 1 \tag{1}$$

Since the validity of the function was limited to a specific number range for each variable, the joint density function becomes:

$$\int_{1}^{3}\int_{0}^{2} k*(x^2+y^2)dxdy = 1 \tag{2}$$

First, I integrated with respect to **x**

$$k*\int_{1}^{3}[(\frac{x^3}{3}+x*y^2)\Big|_0^2 dy = 1 \tag{3}$$