Calculus III (Math 241)

1. Compute the value of the integral

$$\int_{[0,1]^2} x(x-y)(x+y)\, d^2(x,y).$$

2. A lamina occupies the triangular region D with vertices $(0,0)$, $(2,1)$, $(0,3)$ and has density $\rho(x,y) = x+y$.

   (a) Set up and evaluate the double integral that gives the mass m of the lamina.

   (b) Find the coordinates $(\bar{x}, \bar{y})$ of the center of mass.