

MATH 253 – WORKSHEET 25
MASS AND CENTER OF MASS

Suppose we have mass distributed in a region R according to the density profile $\rho(x, y)$. Then the *total mass* is

$$M = \iint_R \rho(x, y) \, dA$$

and the *center of mass* is located at the point (\bar{x}, \bar{y}) where

$$\bar{x} = \frac{\iint_R x\rho(x, y) \, dA}{\iint_R \rho(x, y) \, dA}, \quad \bar{y} = \frac{\iint_R y\rho(x, y) \, dA}{\iint_R \rho(x, y) \, dA}$$

Example. Find the center of mass of the region inside $x^2 + y^2 = 2y$ and outside $x^2 + y^2 = 1$ if the density is inversely proportional to the distance from the origin.