

MA 225 Section A  
Exercises on Centroids  
October 31, 2008

**Note:** The term *centroid* is used to describe the center of mass  $(\bar{x}, \bar{y})$  of a flat plate (a lamina) with *uniform density* that occupies a region  $R$  in the plane. In this case, the density function  $\rho(x, y)$  is constant, and consequently, it drops out of the computation for  $\bar{x}$  and  $\bar{y}$ .

1. Find the centroid of the region bounded by the graph of  $y = 1/x$  and the line  $2x + 2y = 5$ .
2. Find the centroid of the region obtained by connecting the points  $(0, 0)$ ,  $(4, 0)$ ,  $(4, 4)$ ,  $(2, 4)$ ,  $(2, 1)$ ,  $(0, 1)$ , and  $(0, 0)$  in order by line segments.
3. Find the centroid of the region bounded by the graphs of  $y = x^2$  and  $y = x^3$ .
4. Let  $R$  be the region in the first quadrant that inside the circle of radius  $a$  centered at the origin. Find its centroid.

Answers:

1.  $(\bar{x}, \bar{y}) = \left( \frac{9}{30 - 32 \ln 2}, \frac{9}{30 - 32 \ln 2} \right)$

2.  $(\bar{x}, \bar{y}) = \left( \frac{13}{5}, \frac{17}{10} \right)$

3.  $(\bar{x}, \bar{y}) = \left( \frac{3}{5}, \frac{12}{35} \right)$

4.  $(\bar{x}, \bar{y}) = \left( \frac{4a}{3\pi}, \frac{4a}{3\pi} \right)$