

Project 1

For this project, your solutions should be written up neatly and completely on separate sheets of paper, with this page stapled on top.

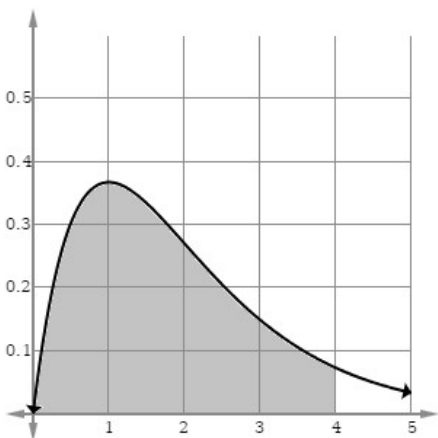
The **centroid** of a region is its center of mass. If you imagine spinning the object on a table, it would spin about its center of mass. The centroid is defined as the point (\bar{x}, \bar{y}) , where A is the area and \bar{x}, \bar{y} are:

$$A = \int_a^b f(x) dx$$

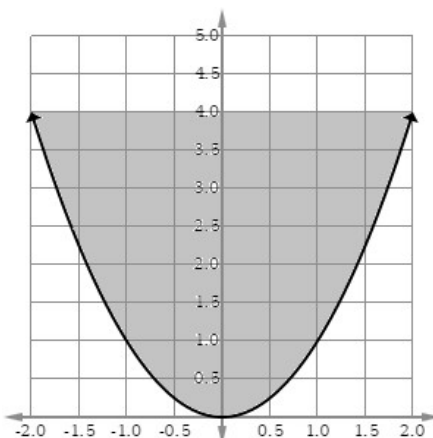
$$\bar{x} = \frac{1}{A} \int_a^b xf(x) dx$$

$$\bar{y} = \frac{1}{A} \int_a^b \frac{1}{2} [f(x)]^2 dx$$

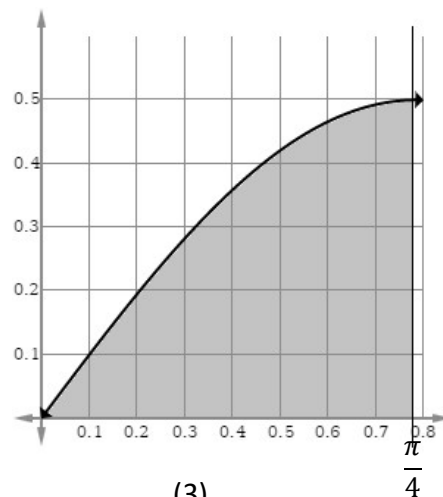
1. Find the centroid of the region bounded by $y = xe^{-x}$ and the lines $x = 0, x = 4$, and $y = 0$. Label the centroid on the graph of the region. Does it seem appropriate for the center of mass?
2. Find the centroid of the parabolic region bounded between $y = 4$ and $y = x^2$. Label the centroid on the given graph of the region. Does it seem appropriate for the center of mass?
3. Find the centroid of the region bounded by $y = \sin x \cos x$ and $x = 0, x = \pi/4$ and $y = 0$. Label the centroid on the given graph of the region. Does it seem appropriate for the center of mass?



(1)



(2)



(3)