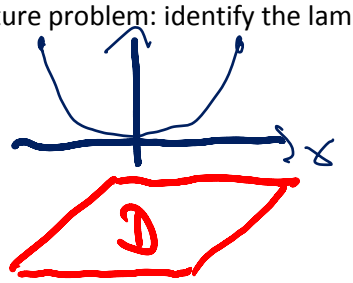
Calc 2 Practice Exam Supplement

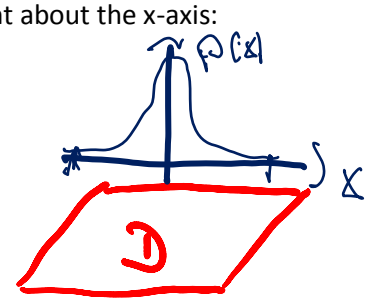
Here are a few supplementary questions involving mass, moments, and center of gravity. Any of these questions could appear on the exam 2 (or not).

1. Define the mass m, the moments M_x, M_y, and the center of gravity $(\bar{x}, \bar{y})$ of a lamina D with density function $\rho(x, y)$

2. True/False
   a. If D is a lamina of uniform density in form of a rectangle from $(0,0)$ to $(2,4)$, then the center of gravity $(\bar{x}, \bar{y}) = (1,2)$
   b. If D is a lamina bounded by the x-axis, the y-axis, and the line from (0, 2) to (1, 0) with density function $\rho(x, y) = x^2 \sin(y) * \cos(x^2 + y^2)$ then the center of gravity is (1, 2)

3. Picture problem: identify the lamina with the larger moment about the x-axis:





4. Find the mass and center of gravity of the lamina that occupies the region D and has the given density function:
   a. $D = \{(x, y) : 0 \leq x \leq 2, -1 \leq y \leq 1\}$ and $\rho(x, y) = xy^2$

   b. D is the triangular region with vertices (0,0), (1,1), (4,0) and $\rho(x, y) = x$

   c. D is bounded by the parabola $x = y^2$ and the line $y = x - 2$, and $\rho(x, y) = 3$

   d. D is enclosed by the cardioid $r = 1 + \cos(\theta)$ and $\rho(x, y) = \sqrt{x^2 + y^2}$