

Find the center of mass of the following regions in the plane.

1. The region in the first quadrant bounded by the parabola $y = 4 - x^2$.
2. The region in the first quadrant bounded by the parabola $y = x^2$ and the line $y = x$.
3. The region bounded by the parabolas $x = y^2$ and $x^2 = -8y$.
4. The region bounded by $y = 4x - x^2$ and $y = 0$.
5. The region in the first quadrant bounded by $x^2 + y^2 = a^2$.
6. Find the center of mass of a triangle with vertices at $(0, 0)$, $(0, a)$ and (b, c) where a, b, c are all positive.
7. Use what you found in the previous problem to give a derivation of the volume of a cone of height h and radius r .