1. Find the volume of the solid whose base is the region enclosed by the curves \( y = x^2 \) and \( y = x \) and whose cross-sections perpendicular to the base and to the y-axis are squares.

2. Find the volume of the solid whose base is the region enclosed by the curves \( y = x^2 \) and \( y = x \) and whose cross-sections perpendicular to the base and to the x-axis are semicircles.

3. Set up but do not evaluate two integrals, one with respect to \( x \) and one with respect to \( y \), to find the volume of the solid obtained by rotating the region(s) enclosed by the given curves about the given line.
   
   (a) \( y = x + 2, \ y = 5, \ x = 1 \) about the y-axis
   
   (b) \( x = y^2 - 2y, \ y = x + 2 \) about the line \( x = -2 \)
   
   (c) \( y = \tan x \) on \((-\pi/2, \pi/2)\), \( y = 1, \ y = -1, \ x = 0 \) about the line \( y = 2 \)

4. Find the average value of the given function on the given interval.
   
   (a) \( f(x) = 3 \cos x \) on \([-\pi/2, \pi/2]\)
   
   (b) \( g(t) = t^2/(t^3 + 3)^2 \) on \([-1, 1]\)

5. Find the volume of the solid formed by revolving the area between the curves \( x^2 - 2x \) and \(-2x^2 + 4x\) around the line \( y = 2\).

6. Find the volume of the solid whose base is the region enclosed by the lines \( y = x - 1, \ y = -x - 1, \ y = -x + 1, \) and \( y = x + 1 \), and whose cross-sections perpendicular to the base and to the x-axis are equilateral triangles.

7. Find the volumes of the two solids obtained by rotating the area bounded by the curves \( y = x^2 \) and \( y = x^3 \) about the x-axis and about the y-axis.