I. Set up an integral to find the volume of the solid whose base is the region bounded by the graphs of $y = 4 - x^2$ and $y = 0$ if
a) cross-sections perpendicular to the x-axis are squares.

b) cross-sections perpendicular to the y-axis are semi-circles with a radius in the xy-plane.

II. Set up an integral integrating with respect to x to find the volume of the solid of revolution obtained when the region bounded by the graphs of $y = x^2$ and $y = 0$ and $x = 2$ is rotated around
a) the x-axis

b) the line $y = 4$

c) the y-axis

d) the line $x = 2$

III. Set up an integral integrating with respect to y to find the volume of the solid of revolution obtained when the region bounded by the graphs of $y = x^2$ and $y = 0$ and $x = 2$ is rotated around
a. the x-axis
b. the line \( y = 4 \)

c. the \( y \)-axis

d. the line \( x = 2 \)

IV. Find the arc length of the graph of \( y = 5 - \sqrt{x^3} \) from the point \( A(1,4) \) to the point \( B(4,-3) \).

V. Set up an integral to find the arc length of the graph of \( y = \cos 2x \) from the point \( A(0,1) \) to the point \( B(\pi/2,-1) \).

VI. Set up only to find the center of mass of the region in the first quadrant bounded by the graphs of \( y = 5 - x^2 \), \( y = 1 \), and the \( y \)-axis if

a) the density at any point is given by \( \delta(x) = x^2 \).

b) the density at any point is given by \( \delta(y) = \sqrt{y} \).