Problem 1

Sketch the region enclosed by each given curves and find its area.

1. $y = x^2$, $y = 4x - x^2$
2. $y = e^x$, $y = xe^x$, $x = 0$
3. $x = 2y^2$, $x = 4 + y^2$
4. $y = |x|$, $y = x^2 - 2$

Problem 2

Find the volume of the solid obtained by rotating the region bounded by the given curves about the specified line.

1. $y = x^3$, $y = 8$, $x = 0$ about the y axis.
2. $y = 1 - x^2$, $y = 0$, about the x axis.
3. $y = \frac{1}{4}x^4$, $y = 5 - x^2$, about the x axis.
4. $y = e^{-x}$, $y = 1$, $x = 2$ about the $y = 2$ axis.

Problem 3

Use the method of cylindrical shells to find the volume generated by rotating the region bounded by the given curves about the specified axis or line.

1. $y = \sqrt[3]{x}$, $y = 0$, $x = 1$ about the y axis.
2. $y = \sqrt{x}$, $x = 0$, $y = 2$ about the x axis.
3. $y = x^2$, $y = 2 - x^2$ about the $x = 1$ axis.
4. $x = y^2 + 1$, $x = 2$ about the $y = -2$ axis.