Name:

Problem 1: Sketch the region enclosed by the given curves and find its area.

1. $y = \cos x$, $y = 1 - \cos x$, $x = 0$, $x = \pi$.
2. $y = x^4$ and $y = 2 - |x|$.
3. $x = 2y^2$ and $x = y^2 + 4$.

Problem 2: Find the volume of the solid obtained by rotating the region bounded by the given curves about the specified line.

1. $y = \sqrt{x-1}$, $y = 0$, $x = 5$ about x-axis.
2. $y^2 = x$, $x = 2y$ about the y-axis.
3. $y = \sin x$, $y = \cos x$, $x = 0$, $x = \pi/4$ about $y = -1$.

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.

1. $xy = 1$, $x = 0$, $y = 1$, $y = 3$ about x-axis.
2. $y = 4x - x^2$, $y = x$ about y-axis.
3. $x = 2y^2$, $x = y^2 + 1$ about $y = -2$.

Problem 4: Find the average value of the following functions on the given interval.

1. $f(x) = \cos^4 x \sin x$ on $[0, \pi]$.
2. $g(t) = \dfrac{t}{\sqrt{3+t^2}}$ on $[1, 3]$.

Problem 5: When a particle is located at a distance x meters from the origin, a force of $\cos(\pi x/3)$ newtons acts on it. How much work is done in moving the particle from $x = 1$ to $x = 2$?