

Show all work to receive full credit.

1. Sketch and find the area of the region enclosed by $x = 1 - y^2$ and $x = y^2 - 1$.
2. Sketch the region and find the volume of the region enclosed by $y = x^2$, $y = x$, and $x = 0$, rotated about the x -axis.
3. Sketch the region and find the volume of the region enclosed by $y = \sqrt{x}$, $y = 0$, and $x = 1$ around

- (a) x -axis
- (b) y -axis
- (c) $x = -2$
- (d) $x = 3$
- (e) $y = 1$
- (f) $y = -1$

4. Differentiate the following functions:

- (a) $y = \ln \left(\frac{x^{1/4} \sqrt{x^2 + 1}}{e^x (3x + 2)^5} \right)$
- (b) $f(x) = \sin(e^x) \ln(\tan x + e^x)$
- (c) $f(x) = e^{x \sin(2x)}$
- (d) $f(x) = \frac{\ln(\tan x)}{1 + e^{x^3}}$

5. Integrate the following:

- (a) $\int_e^6 \frac{dx}{x \ln x}$
- (b) $\int \frac{\cos(x)}{2 + \sin(x)} dx$
- (c) $\int \sin(x) e^{\cos(x)} dx$
- (d) $\int x^5 e^{\ln x^2} dx$

6. Use Logarithmic Differentiation to find $\frac{dy}{dx}$

- (a) $y = (\sin x)^{\ln x}$
- (b) $y = \frac{x^{3/4} \sqrt{x^2 + 1}}{(3x + 2)^5}$