

## Problem Set 10

- 1) Compute the antiderivative of  $f(x) = \frac{x^2}{\sqrt{9-x^2}}$ .

2) Compute the following integrals:

(a)  $\int \frac{x^2}{4+x^2} dx.$

(b)  $\int \frac{dx}{x^2\sqrt{x^2+1}}.$

(c)  $\int \frac{\sqrt{9-w^2}}{w^2} dw.$

(d)  $\int \sqrt{\frac{x+1}{1-x}} dx.$

3) Here are some harder ones:

(a)

$$\int_{\ln(3/4)}^{\ln(4/3)} \frac{e^t dt}{(1 + e^{2t})^{3/2}}$$

(b)

$$\int \frac{x dx}{\sqrt{x^2 - 1}}$$

(c)

$$\int \sqrt{\frac{4-x}{x}} dx$$

(d)

$$\int \sqrt{x} \sqrt{1-x} dx$$

4) See if you can solve these:

(a) Find the volume of the solid formed by revolving the region bounded by the graphs of  $y = \sin x + \sec x$ ,  $y = 0$ ,  $x = 0$ , and  $x = \pi/3$  about the  $x$ -axis.

(b) Find the area enclosed by the ellipse:  $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ .

(c) Evaluate  $\int x^3 \sqrt{1-x^2} dx$  using (i) integration by parts, (ii) a  $u$ -substitution, and (iii) a trigonometric substitution.