

7.3 - Trigonometric Substitution

Preparation (Watch at Home)

7.3a

Exercise:

Evaluate the integral.

$$\int \frac{x^3}{\sqrt{x^2 + 4}} dx$$

7.3b

Pattern recognition for substitutions

$$\sqrt{x^2 + a^2} \rightarrow x = a \tan \theta \implies \sqrt{x^2 + a^2} = a \sec \theta$$

$$\sqrt{x^2 - a^2} \rightarrow x = a \sec \theta \implies \sqrt{x^2 - a^2} = a \tan \theta$$

$$\sqrt{a^2 - x^2} \rightarrow x = a \sin \theta \implies \sqrt{a^2 - x^2} = a \cos \theta$$

Exercises:

Evaluate the integral.

7.3c

$$\int \frac{dt}{t^2 \sqrt{t^2 - 16}}$$

$$\int_0^3 \frac{x}{\sqrt{36-x^2}} dx$$

In-Class Discussion

7.3d

$$\int_0^{\frac{2}{3}} \sqrt{4-9x^2} dx$$

7.3e

$$\int \frac{x^2}{(3 + 4x - 4x^2)^{\frac{3}{2}}} dx$$

In-Class Practice

Evaluate the integral.

1. $\int \frac{x^2}{\sqrt{9-x^2}} dx$

$$2. \int_0^2 \frac{dt}{\sqrt{4+t^2}} dt$$

[illegible]

4. $\int_0^1 \sqrt{x - x^2} \, dx$
