

## §7.3 Trigonometric Substitution

## In-class Activity 7.3



Dr. Jorge Basilio

[gbasilio@pasadena.edu](mailto:gbasilio@pasadena.edu)**Activity 1: Case:  $\sqrt{a^2 - x^2}$** (a) Evaluate  $\int \frac{1}{\sqrt{9 - x^2}} dx$  in two ways:(i) using  $\sin^{-1}(x)$  and it's DR/ADR, and (ii) using trig sub(b) Find:  $\int \sqrt{16 - x^2} dx$ **Activity 2: Case:  $\sqrt{a^2 - x^2}$** Find the **area of a circle of radius  $a > 0$**  by setting up an appropriate definite integral and solving it with trig sub.

### Activity 3: Case: $\sqrt{a^2 + x^2}$

Evaluate:

(a)  $\int \frac{1}{\sqrt{x^2 + 9}} dx$

(b)  $\int_0^{3\sqrt{3}/2} \frac{x^3}{(4x + 9)^{3/2}} dx$

*(Example 6 in our book, this is a hard example. Hint: start with a sub  $y = 2x$ .)*

### Activity 4: Case: $\sqrt{x^2 - a^2}$

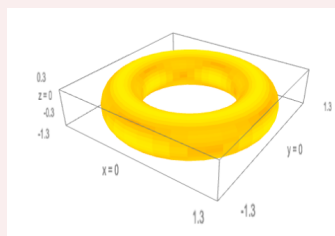
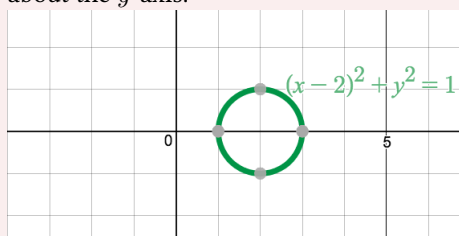
Evaluate:  $\int \frac{1}{x^2 \sqrt{4x^2 - 16}} dx$

### Activity 5: Application to integrals with $ax^2 + bx + c$

Evaluate:  $\int \frac{1}{(x^2 - 6x + 11)^2} dx$

### Activity 6: Application: Volume of a Doughnut

Find the volume of the “doughnut”, that is, the inside of the surface of revolution obtained by rotating the circle  $(x - 2)^2 + y^2 = 1$  about the  $y$ -axis.



You may use either the Washer Method or the Shell Method.