

# Math 2300-007: Trig. Substitution

(Thanks to Faan Tone Liu)

## Key Points:

- Use these substitutions when you see integrals with  $\sqrt{a^2 - x^2}$  or  $\sqrt{a^2 + x^2}$ .
- Substitution for  $\sqrt{a^2 + x^2}$ :

- Substitution for  $\sqrt{a^2 - x^2}$ :

- It's worth remembering:

$$\int \frac{1}{a^2 + x^2} dx =$$

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

- Other notes and tips:

Compute the following integrals:

1.  $\int \frac{1}{\sqrt{16+x^2}} dx$

2.  $\int x^3 \sqrt{1+x^2} dx$

3.  $\int \frac{1}{y^2 \sqrt{4-y^2}} dy$

4.  $\int \frac{x^3}{\sqrt{9-x^2}} dx$  (What other method could you use?)

5.  $\int z\sqrt{1-z^2} dz$  (Hint: Can you do this another way?)

6.  $\int \frac{1}{36+x^2} dx$  (Hint: Try some sneaky algebra first.)

7.  $\int \frac{1}{x^2+2x+5} dx$  (Hint: Complete the square.)