Math 2300-013: Trig. Substitution

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:

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

- Other notes and tips:

Compute the following integrals:

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

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

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

4. $\displaystyle\int \frac{x^3}{\sqrt{9-x^2}}\,dx$ (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.)