October 31, 2016

Announcements - HAPPY HALLLOWEEN!

- Assigned reading for the week: sections 7.3, 7.4 and 7.5
- Printout and bring the Worksheet "Algebra and Partial Fractions" with you on Thursday, November 3 for TA sections
- Homework #5 (125 HW # 5ABC, all 3 parts) Due Wednesday, November 2, 11:00pm (complete before section, Tuesday 2/9)
- Quiz #4 (taken from HW # 4BC and # 5AB) Tuesday, November 1 in TA sections

Today

- 7.3 Trigonometric Substitution

Expression

$$\sqrt{a^2 - x^2}$$

Substitution

$$x = a \sin\theta \quad \text{with} \quad -\frac{\pi}{2} \leq \theta \leq \frac{\pi}{2}$$

Identity

$$1 - \sin^2\theta = \cos^2\theta$$

Useful relationships

$$\theta = \arcsin\left(\frac{x}{a}\right)$$

$$\cos\theta = \sqrt{1 - \left(\frac{x}{a}\right)^2} \qquad \tan\theta = \frac{x}{\sqrt{a^2 - x^2}}$$

Expression

$$\sqrt{x^2 - a^2}$$

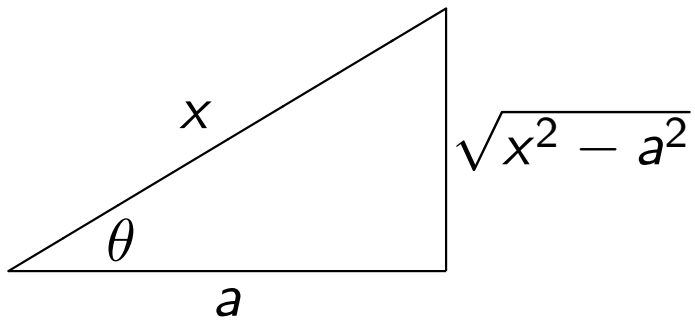
Substitution

$$x = a \sec\theta = \frac{a}{\cos\theta}$$

with

$$0 \leq \theta < \frac{\pi}{2} \quad \text{or} \quad \pi \leq \theta \leq \frac{3\pi}{2}$$

Triangle



Identity

$$\sec^2\theta - 1 = \tan^2\theta$$

Useful relationships

$$\cos\theta = \frac{a}{x}$$

$$\sin\theta = \frac{\sqrt{x^2 - a^2}}{x}$$

$$\tan\theta = \frac{\sqrt{x^2 - a^2}}{a}$$

Expression

$$\sqrt{a^2 + x^2}$$

Substitution

$$x = a \tan\theta \quad \text{with} \quad -\frac{\pi}{2} < \theta < \frac{\pi}{2}$$

Identity

$$1 + \tan^2\theta = \frac{1}{\cos^2\theta}$$

Useful relationships

$$\theta = \arctan\left(\frac{x}{a}\right)$$

$$\cos\theta = \frac{a}{\sqrt{a^2 + x^2}} \qquad \sin\theta = \frac{x}{\sqrt{a^2 + x^2}}$$