

Closing Today: HW_5A,5B (7.1,7.2)
HW_5C (7.3) closes Friday
Closing Next Wed: HW_6A,6B,6C (7.4,7.5,7.7)

Entry Task:

$$\int \sqrt{4 - x^2} dx$$

7.3 Trigonometric Substitution (continued)

CASE	SUBSTITUTION
$\sqrt{a^2 - x^2}$	$x = a \sin(\theta)$, use $\sqrt{a^2 - a^2 \sin^2(\theta)} = a \cos(\theta)$
$\sqrt{a^2 + x^2}$	$x = a \tan(\theta)$, use $\sqrt{a^2 + a^2 \tan^2(\theta)} = a \sec(\theta)$
$\sqrt{x^2 - a^2}$	$x = a \sec(\theta)$, use $\sqrt{a^2 \sec^2(\theta) - a^2} = a \tan(\theta)$

1. Trig Sub
2. Trig Integral (use 7.2 methods)
3. Triangle Trick

If you encounter a 'middle term'

$$\sqrt{ax^2 + bx + c}.$$

Complete the square:

1. $x^2 + 10x =$

2. $x^2 - 6x + 11 =$

3. $14 - 8x - x^2 =$

Full Example:

$$\int \frac{x}{\sqrt{64 - 24x - 4x^2}} dx$$

Complete the square:

$$\begin{aligned} & \sqrt{4(16 - 6x - x^2)} \\ &= 2\sqrt{16 - 6x - x^2} \\ &= 2\sqrt{16 + 9 - 9 - 6x - x^2} \\ &= 2\sqrt{25 - (x + 3)^2} \end{aligned}$$

Check!!!

7.4 Partial Fractions

Goal: Learn a general method to integrate rational functions (a polynomial over a polynomial).

This is also an important algebraic method for simplifying fractions which you will use in many other math courses.