

## Sections 7.2 Lecture Notes

**Note:** Don't forget everything you've learned so far! Methods for things like factoring and distributing are still valid with trigonometric functions.

**Recall:**  $(a + b)(c + d) = ac + ad + bc + bd$

**Examples:**

(1)

$$\begin{aligned}(x + y)(2x + 3y) &= 2x^2 + 3xy + 2xy + 3y^2 \\ &= 2x^2 + 5xy + 3y^2\end{aligned}$$

(2) (Note: this is only one way of factoring)

$$\begin{aligned}x^2 + 6x + 8 &= x^2 + 4x + 2x + 8 \\ &= x(x + 4) + 2(x + 4) \\ &= (x + 2)(x + 4)\end{aligned}$$

(3) (Note: this uses the formula for factoring a difference of squares)

$$\begin{aligned}x^2 - 16 &= x^2 - 4^2 \\ &= (x - 4)(x + 4)\end{aligned}$$

**Exercises:**

(1) Distribute  $(1 + \cos \theta)(1 - \cos \theta)$

(2) Factor  $\tan^2 \theta - 4$

(3) Factor  $2 \sin^2 t + \sin t - 1$

(4) Use rules of fractions to rewrite as a product of two trig functions:  $\tan t + \cot t$

## Verifying Identities (also called trigonometric proofs)

To verify a trigonometric identity, you have to show that the statement is true. There are two main strategies for verifying an identity:

- (1) Start with one side of the equation and rewrite it until it looks like the other side.
- (2) Rewrite both sides until they look like each other.

**Exercise:** Verify the following

$$(1) (\cos \theta + \sin \theta)^2 = 1 + 2 \sin \theta \cos \theta$$

$$(4) \frac{\sin t}{1 - \cos t} = \frac{1 + \cos t}{\sin t}$$

$$(2) \frac{\sin^2 \theta}{1 + \cos \theta} = 1 - \cos \theta$$

$$(5) \frac{\sec x + \tan x}{\sec x - \tan x} = \frac{1 + \sin x}{1 - \sin x}$$

$$(3) \frac{\csc t}{\cot t} - \frac{\cot t}{\csc t} = \tan t \sin t$$