Homework: pg 310 #1ab, 2, 3, 4 (cross multiply), 5, 7ac, 8bcdf, 11

Proving Trigonometric Identities: Part 1

**y**

Recall: The Unit Circle

**(0,1)**

**P(cosθ, sinθ)**

**r**

**y**

**x**

**θ**

**x**

**(1,0)**

The Pythagorean Theorem states that a2 + b2 = c2.

If we consider the right triangle in the above diagram, we get:

y2 + x2 = r2

But for the unit circle when r = 1,

x = cosθ

y = sinθ

So, we substitute these values into the equation above to get:

sin2θ + cos2θ = 1

This identity is referred to as a *Pythagorean Identity*.

This can also be rearranged to get the following variations:

 sin2θ = 1 - cos2θ

 cos2θ = 1 - sin2θ

Also, it may have been briefly mentioned before that:



This identity is referred to as a *Quotient Identity.*

# A few other identities that may be helpful include the following:

 1 + tan2θ = sec2θ

 1 + cot2θ = csc2θ

 

# Examples

Prove the following trig identities:

a) $\frac{\sin(θ)}{\tan(θ)}=\cos(θ)$ b) $\frac{1}{\cos(θ)}-\cos(θ)=\sin(θ)\tan(θ)$

c) $2sin^{2}θ-1=sin^{2}θ-cos^{2}θ$ d) $\frac{1}{sin^{2}θ}+\frac{1}{cos^{2}θ}=\frac{1}{sin^{2}θcos^{2}θ}$

e) $\frac{sin^{2}θ}{1-\cos(θ)}=1+\cos(θ)$ f) $\tan(θ)=\frac{\sin(θ)+sin^{2}θ}{\cos(θ)(1+\sin(θ))}$