

Math 1060 Verifying Identities Worksheet

Parts I and II are due in class on _____

Name: _____

Pre-requisite Skill: In order to verify trigonometric identities, it is vital that you have strong algebraic skills in manipulating rational expressions as well as multiplying and factoring multi-term expressions. If you feel that you need more practice in these prerequisite algebra skills you can access MyMathLab exercises from many Pearson books by going to <http://www.interactmath.com/>.

These are *free* online practice problems with “Help Me Solve This” and “View an Example” features. No fee or password is required. However, you cannot save your work from session to session.

After you enter the site, you will need to choose a particular textbook from a pull down menu. For basic algebraic work, a good starting place is Bittinger: Intermediate Algebra, Concepts and Applications, 8e (this is the text we currently use for Math 1010 at SLCC). For college algebra concepts you may want to look at Sullivan: College Algebra, 9e (this is the text we currently use for Math 1050 at SLCC). After you choose your text, choose the appropriate chapter and section to review the desired concepts.

I Warm-up:

- 1) Answer the following using at least two complete sentences. What is the difference between an equation and an identity?

- 2) Write down the definitions of the six trigonometric functions (Hint see section 1.4)

- 3) Which trigonometric identities follow directly from the definitions of the trig functions?

4) Write down a proof of the Fundamental Pythagorean identity.

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

II Communicating your ideas:

At each step in the verification of the identities below, fill in the blank with an appropriate justification. An example is provided.

Example:

Prove that $\frac{\sin^3(x) + \sin(x)\cos^2(x)}{\cos(x)} = \tan(x)$

Choose the left hand side to “simplify” with algebraic steps and basic trig identities. The final simplified form should match the right hand side.

Pick *one* side to “simplify”	Equivalent Statement	Rationale
$\frac{\sin^3(x) + \sin(x)\cos^2(x)}{\cos(x)}$	$= \frac{\sin(x)(\sin^2(x) + \cos^2(x))}{\cos(x)}$	<i>Factor sin(x) out of the numerator</i>
	$= \frac{\sin(x)}{\cos(x)}$	<i>By the fundamental Pythagorean identity</i>
	$= \tan(x)$	<i>Basic trig identity for tangent</i>

- 7) It is possible to prove an identity by working separately with the two sides until they can be shown to be equivalent to the same expression. Please fill in the missing steps in the following tables.

	Equivalent Statement	Rationale		Equivalent Statement	Rationale
$(1 + \cot \alpha)^2 - 2 \cot \alpha$	$= \cot^2 \alpha + 2 \cot \alpha + 1 - 2 \cot \alpha$		$\frac{1}{(1 - \cos \alpha)(1 + \cos \alpha)}$	$= \frac{1}{1 - \cos^2 \alpha}$	
	$= \cot^2 \alpha + 1$			$= \frac{1}{\sin^2 \alpha}$	
	$= \csc^2 \alpha$			$= \csc^2 \alpha$	

Since $(1 + \cot \alpha)^2 - 2 \cot \alpha = \csc^2 \alpha$ and $\frac{1}{(1 - \cos \alpha)(1 + \cos \alpha)} = \csc^2 \alpha$, you have proven

$$(1 + \cot \alpha)^2 - 2 \cot \alpha = \frac{1}{(1 - \cos \alpha)(1 + \cos \alpha)}$$

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Part III is due in class on _____

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III Verify Identities:

Please verify the following identities. Be sure to follow the processes illustrated in part II **including** providing the appropriate rationale. Don't skip steps!

8) Prove that $\frac{\sin 3\beta}{\sin \beta \cos \beta} = 4 \cos \beta - \sec \beta$

9) Prove that $\tan^2 x = \frac{1 - \cos 2x}{1 + \cos 2x}$