Name: ______________________ **Precalculus Unit 10, Lesson 4**

Aim: How do we prove trigonometric identities involving double angles?

I. Do Now:

1. Given that $\cos A = \frac{1}{4}$, $\cot B = \frac{-\sqrt{5}}{2}$, $\angle A$ terminates in Quadrant IV, and $\frac{\pi}{2} < m\angle A < \pi$.
   Find the exact value of:
   (a) $\sin 2B$ (b) $\cot 2A$ (c) $\sec 2A$

2. Prove the identity: $(\sin x - \cos x)^2 = 1 - \sin 2x$

II. Prove each identity:

3. $\dfrac{\sin 2x}{2\sin^2 x} = \cot x$

4. $\sin 2x = \dfrac{2\tan x}{1+\tan^2 x}$

5. $\dfrac{1-\cos 2x}{\sin 2x} = \tan x$

6. $\tan x + \cot x = 2\csc 2x$

7. $\dfrac{5\sin x - \cos 2x - 11}{2\sin x - 3} = \sin x + 4$

8. $\dfrac{\cos 2x}{1+\sin 2x} = \dfrac{\cot x - 1}{\cot x + 1}$

9. Prove the triple-angle identity for sine:
   $\sin 3x = 3\sin x - 4\sin^3 x$
   Hint: Express $\sin 3x$ as $\sin(2x + x)$ and use the angle sum identity for sine.

10. Express $\cos 3x$ in terms of $\cos x$.
    (i.e., derive the *triple-angle* formula for cosine)

HW29
• p. 451: 20, 26, 82, 84, 85
• p. 455: 25, 29, 38, 40