Name: _____ **Precalculus Unit 10, Lesson 3**

Aim: What are the trigonometric double angle identities?

I. Do Now:

1. If $\sin\theta = -\frac{4}{5}$ and $\cot\theta < 0$, find the value of $\cos(\theta + 180°)$.

2. Write each expression in terms of a single trig function:
   $1 - \cos^2 x =$ _____
   $1 - \sin^2 x =$ _____
   $\sec^2 x - 1 =$ _____
   $\csc^2 x - 1 =$ _____

Double Angle Identities

$\sin 2x =$

$\cos 2x =$

$\cos 2x =$

$\cos 2x =$

$\tan 2x =$

II. Derivation of Double Angle Identities

3. Derive a formula for $\sin 2x = \sin(x + x)$.

4. Derive a formula for $\cos 2x = \cos(x + x)$.

5. Use the formula you derived in #4 with the results from #2 to derive two alternate forms of the identity for $\cos 2x$.

6. Derive a formula for $\tan 2x = \tan(x + x)$.

III. Applications

7. If $\cos\theta = \frac{5}{13}$ and $\frac{3\pi}{2} < \theta < 2\pi$, find:
   (a) $\sin 2\theta$
   (b) $\cos 2\theta$
   (c) $\tan 2\theta$

8. Write each expression in terms of a single trigonometric function:
   (a) $2\sin 3°\cos 3°$
   (b) $\cos^2 20° - \sin^2 20°$
   (c) $1 - 2\sin^2 \frac{\pi}{5}$
   (d) $2\cos^2 \frac{\pi}{10} - 1$
   (e) $\dfrac{2\tan 130°}{1 - \tan^2 130°}$

9. Express $\sin 3x$ in terms of $\sin x$.
   (i.e., derive the *triple-angle* formula for sine)

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

HW26
- p. 390: 9, 22, 23, 27, 29, 30
- p. 397: 71, 72, 74