Name _____ Date _____

Practice 9.1: Multi-Angle & Product to Sum Formulas

Use the Double-Angle Formulas to find the of the following trig functions. Show your work.

1. Find the exact values of the trig functions given that.

$\sin u = \frac{3}{5} \qquad 0 < u < \frac{\pi}{2}$

a. $\sin(2u)$ **b.** $\cos(2u)$ **c.** $\tan(2u)$

2. Find the exact values of the trig functions given that.

$\tan u = \frac{5}{12} \qquad 0 < u < \frac{\pi}{2}$

a. $\sin(2u)$ **b.** $\cos(2u)$ **c.** $\tan(2u)$

3. Use the Power-Reducing Formulas to write the expressions in term of the first power of cos. Show your work.

a. $\cos^4 x = \cos^2 x \cdot \cos^2 x$ **b.** $\sin^2 x \cos^2 x$

$= \frac{1+\cos 2x}{2} \cdot \frac{1+\cos 2x}{2}$

$= \frac{1+2\cos 2x+\cos^2 2x}{4} = \frac{1+2\cos 2x+\frac{1+\cos 4x}{2}}{4} \cdot \frac{2}{2}$

$= \frac{2+4\cos 2x+1+\cos 4x}{8} = \frac{3+4\cos 2x+\cos 4x}{8}$

4. Use the half angle formulas to determine the exact values.

$u = 210°$

a. $\sin(105°) = \sin\frac{210°}{2}$ etc **b.** $\cos(105°)$ **c.** $\tan(105°)$

$= -\sqrt{\frac{1-\cos 210°}{2}} = -\sqrt{\frac{1-(-\sqrt{3}/2)}{2}}$

$= -\sqrt{\frac{1+\sqrt{3}/2}{2}} \cdot \frac{2}{2} = -\sqrt{\frac{2+\sqrt{3}}{4}}$

$= -\frac{1}{2}\sqrt{2+\sqrt{3}}$

$\frac{-\sqrt{2+\sqrt{3}}}{2}$

5. Use the half angle formulas to determine the exact values.

$u = 330°$

a. $\sin(165°)$ **b.** $\cos(165°)$ **c.** $\tan(165°)$

6. Use the Product-to-Sum formulas to write the product as a sum.

a. $\sin 5x \cos 3x$ **b.** $3\sin 2x \sin 3x$ **c.** $10\sin 75° \sin 15°$

7. Use the Sum-to-Product formulas to write the sum as a product.

a. $\sin 60° + \sin 30°$ **b.** $\cos 120° + \cos 30°$ **c.** $\sin 5x - \sin 3x$

Verify the identities.

8. $\sin 4x = 2\sin 2x \cos 2x$

9. $\cos^2 2x - \sin^2 2x = \cos 4x$