Name: ____

Double Angle Formulas

Exercise 1: Find sin 2x if cos x = $\frac{3}{5}$ and x is in quadrant I.

Exercise 2: Find the exact value of:

1) $\tan 22.5^0$

2) $\sin 22.5^0$

3) $\cos 15^0$

4) $\tan 112.5^0$

5) $\sin 112.5^0$

6) $\cos 112.5^0$

7) $\sin\frac{\pi}{8}$

8) $\sin\frac{7\pi}{6}$

Exercise 3: Simplify each expression

1) $2\sin^2 2x + \cos 4x$

2) $\frac{\sin 2x}{1-\cos 2x}$

3) 6 sin x cos x

4) 6 $\cos^2$ x – 3

5) 4 – 8 $\sin^2$ x

6) (cos x + sin x)(cos x – sin x)

Exercise 4: Verify each identity:

1) $(\sin x + \cos x)^2 = 1 + \sin 2x$

2) $\csc 2x = \left(\frac{1}{2}\right)\csc x \sec x$

3) $\csc 2\theta = \frac{\csc\theta}{2\cos\theta}$

4) $\cos^4 x - \sin^4 x = \cos 2x$

5) $\sec 2\theta = \frac{\sec^2\theta}{2-\sec^2\theta}$

6) $(\sin x + \cos x)^2 = 1 + \sin 2x$

7) $\cos^2 2\alpha - \sin^2 2\alpha = \cos 4\alpha$

8) $\sin\frac{\alpha}{3}\cos\frac{\alpha}{3} = \frac{1}{2}\sin\frac{2\alpha}{3}$

9) $1 + \cos 10y = 2\cos^2 5y$

Exercise 5: Find the exact solutions of equation in the interval $(0,2\pi)$

1) sin 2x – sin x = 0
2) sin 2x + cos x + 0
3) 4sin x cos x = 0
4) cos 2x – cos x = 0
5) sin 2x sin x = cos x
6) cos 2x + sin x = 0
7) tan 2x – cot x = 0
8) tan 2x -2cos x = 0
9) sin 4x = 2 sin 2x
10) $(\sin 2x + \cos 2x)^2 = 1$

Exercise 6: Find the exact value of sin 2u, cos 2u,and tan 2u using the double-angle formulas.

1) $\sin u = -\frac{4}{5}, \pi < u < \frac{3\pi}{2}$
2) $\cos u = -\frac{2}{3}, \frac{\pi}{2} < u < \pi$
3) $\tan u = \frac{3}{4}, 0 < u < \frac{\pi}{2}$
4) $\cot u = -4, \frac{3\pi}{2} < u < 2\pi$
5) $\sec u = \frac{5}{2}, \frac{\pi}{2} < u < \pi$
6) $\csc u = 3, \frac{\pi}{2} < u < \pi$