

Practice Problems for Exam 3

Verify the following identity:

- $\cos x - \cos^3 x = \cos x \sin^2 x$
- $\frac{1+\sin^2 x}{\cos^2 x} = \frac{1}{\cos^2 x} + \frac{\sin^2 x}{\cos^2 x} = 1 + 2 \tan^2 x$
- $(\sin x + \cos x)^2 = 1 + 2 \sin x \cos x$

Let $\sin s = \frac{1}{3}$, with s in quadrant II and let $\cos t = \frac{3}{4}$, with t in quadrant I.

Find each of the following.

- $\cos(s + t)$
- $\sin(s - t)$
- $\sin \frac{t}{2}$
- $\cos 2s$
- Find the exact value of: $3 \sin \frac{\pi}{8} \cos \frac{\pi}{8}$.
- Given that $\tan \theta = -\frac{3}{4}$ and θ is in quadrant II, find each of following from 9 to 11:
 - $\sin(2\theta)$
 - $\cos(2\theta)$
 - $\tan(2\theta)$
 - If $\cos \theta = \frac{3}{5}$, and $\sin \theta < 0$, find the exact value of $\cos(2\theta)$.

Solve each of the equation for the solutions in the interval $[0, 2\pi)$:

- $2 \cos \theta + \sqrt{2} = 0$
- $\tan \theta = 2 \sin \theta$
- $2 \cos^2 \theta + 1 = 3 \cos \theta$
- $\cos 2\theta = \sin \theta$

Answers:

4. $\frac{-6\sqrt{2}-\sqrt{7}}{12}$

5. $\frac{3+2\sqrt{14}}{12}$

6. $\frac{\sqrt{2}}{4}$

7. $\frac{7}{9}$

8. $\frac{3\sqrt{2}}{4}$

9. $-\frac{24}{25}$

10. $\frac{7}{25}$

11. $-\frac{24}{7}$

12. $-\frac{7}{25}$

13. $135^\circ, 225^\circ$

14. $0^\circ, 180^\circ$

15. $0^\circ, 60^\circ, 300^\circ$

16. $30^\circ, 150^\circ, 270^\circ$