

HOMEWORK 9 - MATH 140

DUE DATE: Monday, November 14

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Read each problem very carefully before starting to solve it. One part of each homework problem will be chosen at random and graded. Each question is worth 1 point. It is necessary to show your work. Correct answers without explanations are worth 0 points.

GOOD LUCK!!

1. Use the information given about θ , $0 \leq \theta \leq 2\pi$, to find the exact value of $\sin(2\theta)$ and $\cos(\frac{\theta}{2})$.

$$(a) \cos \theta = \frac{3}{5}, 0 < \theta < \frac{\pi}{2}, \quad (b) \tan \theta = \frac{1}{2}, \pi < \theta < \frac{3\pi}{2}.$$

2. Establish the following identities:

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

$$(b) \sin^2 \theta \cos^2 \theta = \frac{1}{8}[1 - \cos(4\theta)]$$

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

3. Find the exact value of each expression:

$$(a) \cos(2 \cos^{-1} \frac{4}{5})$$

$$(b) \cos^2(\frac{1}{2} \sin^{-1} \frac{3}{5})$$

4. Convert the following to sums or products containing only sines and cosines as appropriate:

$$(a) \cos(4\theta) \cos(2\theta)$$

$$(b) \sin \frac{\theta}{2} \cos \frac{5\theta}{2}$$

$$(c) \sin(4\theta) + \sin(2\theta)$$

$$(d) \sin \frac{\theta}{2} - \sin \frac{3\theta}{2}$$

5. Establish each identity:

$$(a) \frac{\cos \theta + \cos(3\theta)}{2 \cos(2\theta)} = \cos \theta$$

$$(b) \sin \theta [\sin(3\theta) + \sin(5\theta)] = \cos \theta [\cos(3\theta) - \cos(5\theta)]$$

6. Solve each equation in the interval $0 \leq \theta < 2\pi$.

$$(a) 1 - \cos \theta = \frac{1}{2}$$

$$(b) 4 \sin \theta + 3\sqrt{3} = \sqrt{3}.$$

7. Solve each equation in the interval $0 \leq \theta < 2\pi$.

$$(a) 2 \cos^2 \theta + \cos \theta - 1 = 0$$

$$(b) \sin(2\theta) \sin \theta = \cos \theta$$

8. Solve each equation in the interval $0 \leq \theta < 2\pi$.

$$(a) \sin(2\theta) + \sin(4\theta) = 0$$

$$(b) 1 + \sin \theta = 2 \cos^2 \theta$$

$$(c) \sqrt{3} \sin \theta + \cos \theta = 1$$