

Student: _____	Instructor: Joe Betters	Assignment: 7.7 Classwork Day 1
Date: _____	Course: Pre-Calculus Pre AP (Master Course)	

1. Express the given product as a sum containing only sines or cosines.

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

$$\sin(4\theta) \cos(2\theta) = \underline{\hspace{2cm}}$$

(Simplify your answer, including any radicals. Use integers or fractions for any numbers in the expression.)

2. Express the given sum or difference as a product of sines and/or cosines.

$$\cos \theta + \cos 3\theta$$

$$\cos \theta + \cos 3\theta = \underline{\hspace{2cm}}$$

(Simplify your answer, including any radicals. Use integers or fractions for any numbers in the expression.)

3. Establish the identity.

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

Choose the correct sequence of steps to establish the identity.

- A. $\frac{\sin \theta + \sin(3\theta)}{2 \cos \theta} = \frac{2 \sin(2\theta) \sin \theta}{2 \cos \theta} = \sin(2\theta)$
- B. $\frac{\sin \theta + \sin(3\theta)}{2 \cos \theta} = \frac{2 \sin(2\theta) \cos \theta}{2 \cos \theta} = \sin(2\theta)$
- C. $\frac{\sin \theta + \sin(3\theta)}{2 \cos \theta} = \frac{2 \cos(2\theta) \cos \theta}{2 \cos \theta} = \sin(2\theta)$
- D. $\frac{\sin \theta + \sin(3\theta)}{2 \cos \theta} = \frac{-2 \sin \theta \cos(2\theta)}{2 \cos \theta} = \sin(2\theta)$

4. Establish the identity.

$$1 - \cos(2\theta) + \cos(4\theta) - \cos(6\theta) = 4 \sin \theta \cos(2\theta) \sin(3\theta)$$

Choose the correct set of steps below.

- A.
- $$1 - \cos(2\theta) + \cos(4\theta) - \cos(6\theta)$$
- $$= -2 \sin \theta (\cos \theta + \cos(5\theta))$$
- $$= 4 \sin \theta \cos(2\theta) \sin(3\theta)$$
- B.
- $$1 - \cos(2\theta) + \cos(4\theta) - \cos(6\theta)$$
- $$= -2 \cos \theta (\sin \theta + \sin(5\theta))$$
- $$= 4 \sin \theta \cos(2\theta) \sin(3\theta)$$
- C.
- $$1 - \cos(2\theta) + \cos(4\theta) - \cos(6\theta)$$
- $$= 2 \sin \theta (\sin \theta + \sin(5\theta))$$
- $$= 4 \sin \theta \cos(2\theta) \sin(3\theta)$$
- D.
- $$1 - \cos(2\theta) + \cos(4\theta) - \cos(6\theta)$$
- $$= -2 \cos \theta (\cos \theta + \cos(5\theta))$$
- $$= 4 \sin \theta \cos(2\theta) \sin(3\theta)$$

$$1. \frac{1}{2}[\sin(6\theta) + \sin(2\theta)]$$

$$2. 2 \cos(2\theta) \cos \theta$$

$$3. \text{ B. } \frac{\sin \theta + \sin(3\theta)}{2 \cos \theta} = \frac{2 \sin(2\theta) \cos \theta}{2 \cos \theta} = \sin(2\theta)$$

$$4. \quad 1 - \cos(2\theta) + \cos(4\theta) - \cos(6\theta)$$
$$\text{ C. } \quad = 2 \sin \theta (\sin \theta + \sin(5\theta))$$
$$\quad \quad = 4 \sin \theta \cos(2\theta) \sin(3\theta)$$

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① $\sin(4\theta) \cos(2\theta)$

$$* 2 \sin A \cos B = \sin(A+B) + \sin(A-B)$$

$$\sin A \cos B = \frac{1}{2} (\sin(A+B) + \sin(A-B))$$

$$= \frac{1}{2} (\sin(4\theta+2\theta) + \sin(4\theta-2\theta))$$

$$= \boxed{\frac{1}{2} (\sin 6\theta + \sin 2\theta)}$$

② $\cos \theta + \cos 3\theta$

$$* \cos A + \cos B = 2 \cos\left(\frac{A+B}{2}\right) \cos\left(\frac{A-B}{2}\right)$$

$$= 2 \cos\left(\frac{\theta+3\theta}{2}\right) \cos\left(\frac{\theta-3\theta}{2}\right)$$

$$= \cancel{2 \cos(2\theta) \cos(-\theta)}$$

$$= 2 \cos(2\theta) \cos(-\theta)$$

$$= \boxed{2 \cos 2\theta \cos \theta}$$

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

$$* \frac{\sin A + \sin B}{2 \cos A} = \sin 2\theta$$

$$* \frac{2 \sin\left(\frac{A+B}{2}\right) \cos\left(\frac{A-B}{2}\right)}{2 \cos A} = \sin 2\theta$$

$$\frac{2 \sin\left(\frac{\theta+3\theta}{2}\right) \cos\left(\frac{\theta-3\theta}{2}\right)}{2 \cos \theta} = \sin 2\theta$$

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

$$\frac{2 \sin(2\theta) \cos(\theta)}{2 \cos(\theta)} = \sin 2\theta$$

$$\boxed{\sin 2\theta = \sin 2\theta}$$

\square

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$$\textcircled{4} \quad 1 - \cos 2\theta + \cos 4\theta - \cos 6\theta = 4 \sin \theta \cos 2\theta \sin 3\theta$$

$$(\overset{\cos 0}{\cancel{\cos 0}} - \cos 2\theta) + (\cos 4\theta - \cos 6\theta) =$$

$$\left(-2 \sin \frac{0+2\theta}{2} \sin \frac{0-2\theta}{2}\right) + \left(-2 \sin \frac{4\theta+6\theta}{2} \sin \frac{4\theta-6\theta}{2}\right) =$$

$$\left(-2 \sin \theta \sin(-\theta)\right) + \left(-2 \sin 5\theta \sin(-\theta)\right) =$$

$$2 \sin^2 \theta + 2 \sin 5\theta \sin \theta =$$

$$2 \sin \theta (\sin \theta + \sin 5\theta) =$$

$$2 \sin \theta \left(2 \sin \frac{\theta+5\theta}{2} \cos \frac{\theta-5\theta}{2}\right) =$$

$$2 \sin \theta (2 \sin 3\theta \cos(-2\theta)) =$$

$$2 \sin \theta (2 \sin 3\theta \cos 2\theta) =$$

$$\boxed{4 \sin \theta \cos 2\theta \sin 3\theta} =$$