

Product-to-Sum and Sum-to-Product

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

Use the product-to-sum identities to rewrite the expression as the sum or difference of two functions.

1) $\cos 49^\circ \cos 12^\circ$

A) $\frac{1}{2} \sin 37^\circ + \frac{1}{2} \sin 61^\circ$

B) $\frac{1}{2} \sin 61^\circ - \frac{1}{2} \sin 37^\circ$

C) $\frac{1}{2} \cos 37^\circ - \frac{1}{2} \cos 61^\circ$

D) $\frac{1}{2} \cos 37^\circ + \frac{1}{2} \cos 61^\circ$

1) _____

2) $\sin 32^\circ \cos 3^\circ$

A) $\frac{1}{2} \cos 35^\circ + \frac{1}{2} \cos 29^\circ$

B) $\frac{1}{2} \sin 35^\circ + \frac{1}{2} \sin 29^\circ$

C) $\frac{1}{2} \cos 29^\circ - \frac{1}{2} \cos 35^\circ$

D) $\frac{1}{2} \sin 29^\circ - \frac{1}{2} \sin 35^\circ$

2) _____

3) $\cos 4\theta \cos 7\theta$

A) $\cos^2 19\theta^2$

B) $\frac{1}{2} \cos 11\theta - \frac{1}{2} \cos 3\theta$

C) $\frac{1}{2} \cos 3\theta + \frac{1}{2} \cos 11\theta$

D) $\frac{1}{2} \cos 11\theta - \frac{1}{2} \sin 3\theta$

3) _____

4) $\sin 5\theta \sin 7\theta$

A) $-\frac{1}{2} \cos 2\theta - \frac{1}{2} \cos 12\theta$

B) $\frac{1}{2} \cos 2\theta - \frac{1}{2} \cos 12\theta$

C) $\frac{1}{2} \cos 12\theta - \frac{1}{2} \sin 2\theta$

D) $\sin^2 35\theta^2$

4) _____

Use sum-to-product identities to rewrite the expression as a product.

5) $\sin 43^\circ - \sin 27^\circ$

A) $2 \sin 35^\circ \cos 8^\circ$

B) $2 \cos 35^\circ \cos 8^\circ$

C) $-2 \sin 35^\circ \sin 8^\circ$

D) $2 \cos 35^\circ \sin 8^\circ$

5) _____

6) $\sin \frac{\pi}{13} - \sin \frac{\pi}{2}$

A) $2 \cos \frac{11\pi}{52} \cos \frac{15\pi}{52}$

B) $2 \sin \frac{15\pi}{52} \cos \frac{11\pi}{52}$

C) $-2 \cos \frac{15\pi}{52} \sin \frac{11\pi}{52}$

D) $-2 \sin \frac{11\pi}{52} \sin \frac{15\pi}{52}$

6) _____

7) $\cos 6x + \cos 4x$

A) $2 \sin 5x \sin x$

B) $2 \cos 5x \sin x$

C) $2 \cos 5x \cos x$

D) $2 \cos 5x$

7) _____

8) $\sin 10x + \sin 4x$

A) $2 \sin 7x \sin 3x$

B) $2 \sin 7x \cos 3x$

C) $2 \cos 7x \sin 3x$

D) $2 \sin 14x$

8) _____

Express the sum or difference as a product.

9) $\cos 75^\circ + \cos 15^\circ$

A) $-\frac{\sqrt{6}}{4}$

B) $\frac{\sqrt{6}}{4}$

C) $-\frac{\sqrt{6}}{2}$

D) $\frac{\sqrt{6}}{2}$

9) _____

10) $\cos 75^\circ - \cos 15^\circ$

A) $\frac{\sqrt{2}}{2}$

B) $-\frac{\sqrt{2}}{2}$

C) $-\frac{\sqrt{2}}{4}$

D) $\frac{\sqrt{2}}{4}$

10) _____

Complete the identity.

11) $\frac{\sin 2x + \sin 8x}{\cos 2x + \cos 8x} = ?$

A) $\tan 2x + \tan 8x$

C) $\tan 5x$

B) $2 \tan 5x \tan 3x$

D) $\tan 5x \cot 3x$

11) _____

12) $\frac{\sin 4x + \sin 6x}{\cos 3x + \cos 5x} = ?$

A) $\frac{\sin 5x}{\cos 4x}$

C) $\frac{\cos 10x}{\sin 8x}$

B) $\frac{\sin 10x}{\cos 8x}$

D) $\tan \frac{4}{3}x + \tan \frac{6}{5}x$

12) _____

13) $\frac{\cos 5x - \cos 9x}{\cos 5x + \cos 9x} = ?$

A) $\tan 2x \tan 7x$

B) $\cot 7x$

C) $-\tan 7x$

D) 0

13) _____

Use a sum-to-product identity to rewrite the expression.

14) $\sin(7t+8) + \sin(2t+4)$

A) $2\cos\left(\frac{9t+12}{2}\right)\sin\left(\frac{5t+4}{2}\right)$

C) $2\cos\left(\frac{9t+12}{2}\right)\cos\left(\frac{5t+4}{2}\right)$

B) $2\sin\left(\frac{9t+12}{2}\right)\sin\left(\frac{5t+4}{2}\right)$

D) $2\sin\left(\frac{9t+12}{2}\right)\cos\left(\frac{5t+4}{2}\right)$

14) _____

15) $\sin(11t+8) + \sin(2t+1)$

A) $2\cos\left(\frac{13t+9}{2}\right)\cos\left(\frac{9t+7}{2}\right)$

C) $2\sin\left(\frac{13t+9}{2}\right)\cos\left(\frac{9t+7}{2}\right)$

B) $2\cos\left(\frac{13t+9}{2}\right)\sin\left(\frac{9t+7}{2}\right)$

D) $2\sin\left(\frac{13t+9}{2}\right)\sin\left(\frac{9t+7}{2}\right)$

15) _____

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

16) $-2 \sin(5\theta) \sin \theta$

A) $\cos(6\theta) - \cos(4\theta)$

C) $\cos(6\theta) + \cos(4\theta)$

B) $\cos(7\theta) - \cos(3\theta)$

D) $\cos(7\theta) + \cos(3\theta)$

16) _____

17) $2 \cos(7\theta) \cos \theta$

A) $\cos(14\theta) + \cos(2\theta)$

C) $\cos(8\theta) + \cos(6\theta)$

B) $\cos(10\theta) + \sin(4\theta)$

D) $\cos(8\theta) + \sin(6\theta)$

17) _____

Complete the identity.

18) $\sin(5\theta) \sin(7\theta) \cos(5\theta) \cos(7\theta) = ?$

A) $\frac{\sin^2(70\theta)}{4}$

C) $\cos^2(70\theta)$

B) $\frac{\cos^2(12\theta) + \cos^2(2\theta)}{4}$

D) $\frac{\cos^2(2\theta) - \cos^2(12\theta)}{4}$

18) _____

19) $\sin(2\theta) \sin(5\theta) \cos(2\theta) \cos(5\theta) = ?$

A) $\frac{\sin^2(20\theta)}{4}$

C) $\frac{\cos^2(3\theta) - \cos^2(7\theta)}{4}$

B) $\cos^2(20\theta)$

D) $\frac{\cos^2(7\theta) + \cos^2(3\theta)}{4}$

19) _____

Answer Key

Testname: PRODUCT-TO-SUM AND SUM-TO-PRODUCT FORMULAS

- 1) D
- 2) B
- 3) C
- 4) B
- 5) D
- 6) C
- 7) C
- 8) B
- 9) D
- 10) B
- 11) C
- 12) A
- 13) A
- 14) D
- 15) C
- 16) A
- 17) C
- 18) D
- 19) C