Student: Cole Lamers **Date:** 07/20/19	**Instructor:** Kelly Galarneau **Course:** CA&T Internet (70263) Galarneau	**Assignment:** 6.4 Product-to-Sum and Sum-to-Product Formulas

1. Complete the following.

   We can rewrite the product of two sines as a difference of two cosines by using the identity $\sin x \sin y =$ ______.

   $\sin x \sin y = \frac{1}{2}[\cos(x-y) - \cos(x+y)]$

2. Complete the following.

   We can rewrite the product of a sine and a cosine as the sum of two sines by using the identity $\sin x \cos y =$ ______.

   $\sin x \cos y = \frac{1}{2}[\sin(x-y) + \sin(x+y)]$

3. Complete the following.

   We can rewrite the sum of two cosines as a product of two cosines by using the identity $\cos x + \cos y =$ ______.

   Select the correct choice given below.

   ✔ **A.** $2\cos\left(\frac{x+y}{2}\right)\cos\left(\frac{x-y}{2}\right)$

   B. $2\sin\left(\frac{x+y}{2}\right)\cos\left(\frac{x-y}{2}\right)$

   C. $2\sin\left(\frac{x-y}{2}\right)\cos\left(\frac{x+y}{2}\right)$

   D. $-2\sin\left(\frac{x+y}{2}\right)\sin\left(\frac{x-y}{2}\right)$

4. Identify whether the following equation is true or false.

   $\sin x + \sin y = \sin(x+y)$

   Choose the correct answer below.

   A. True, because $\sin x + \sin y = 2\sin\left(\frac{x+y}{2}\right)\cos\left(\frac{x-y}{2}\right)$ which is equal to $\sin(x+y)$.

   B. False, because $\sin x + \sin y = \sin(x+y)\cos(x-y)$ and $\sin(x+y) = \sin x \cos y + \cos x \sin y$.

   C. True, because $\sin x + \sin y = \sin x \cos y + \cos x \sin y$ which is equal to $\sin(x+y)$.

   ✔ **D.** False, because $\sin x + \sin y = 2\sin\left(\frac{x+y}{2}\right)\cos\left(\frac{x-y}{2}\right)$ and $\sin(x+y) = \sin x \cos y + \cos x \sin y$.

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

   $\sin(9x)\cos(5x)$

   $\sin(9x)\cos(5x) = \frac{1}{2}[\sin(14x) + \sin(4x)]$

   (Simplify your answer.)

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

   $\cos(4x)\cos(7x)$

   $\cos(4x)\cos(7x) = \frac{1}{2}[\cos(11x) + \cos(3x)]$

   (Simplify your answer.)

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

$\sin(7x)\sin(4x)$

$\sin(7x)\sin(4x) = \frac{1}{2}[\cos(3x) - \cos(11x)]$

(Simplify your answer.)

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

$\cos 51^\circ \sin 21^\circ$

$\cos 51^\circ \sin 21^\circ = \frac{1}{2}\sin(72) - \frac{1}{4}$

(Simplify your answer. Do not include the degree symbol in your answer. Use integers or fractions for any numbers in the expression.)

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

$\cos 50^\circ \sin 20^\circ$

$\cos 50^\circ \sin 20^\circ = \frac{1}{2}\sin(70) - \frac{1}{4}$

(Simplify your answer. Do not include the degree symbol in your answer. Use integers or fractions for any numbers in the expression.)

10. Use the product-to-sum identities to rewrite the expression.

$\sin\left(\frac{\pi}{5}\right)\cos\left(\frac{\pi}{9}\right)$

Which of the following is equivalent to $\sin\left(\frac{\pi}{5}\right)\cos\left(\frac{\pi}{9}\right)$?

- A. $\frac{1}{2}\left(\cos\frac{14\pi}{45} + \cos\frac{4\pi}{45}\right)$
- B. $\frac{1}{2}\left(\sin\frac{14\pi}{45} - \sin\frac{4\pi}{45}\right)$
- C. $\sin\frac{14\pi}{45} + \sin\frac{4\pi}{45}$
- D. $\frac{1}{2}\left(\sin\frac{14\pi}{45} + \sin\frac{4\pi}{45}\right)$

11. Use the product-to-sum identities to rewrite the expression.

$\cos\left(\frac{\pi}{4}\right)\sin\left(\frac{\pi}{7}\right)$

Which of the following is equivalent to $\cos\left(\frac{\pi}{4}\right)\sin\left(\frac{\pi}{7}\right)$?

- A. $\sin\frac{11\pi}{28} - \sin\frac{3\pi}{28}$
- B. $\frac{1}{2}\left(\cos\frac{11\pi}{28} - \cos\frac{3\pi}{28}\right)$
- C. $\frac{1}{2}\left(\sin\frac{11\pi}{28} + \sin\frac{3\pi}{28}\right)$
- D. $\frac{1}{2}\left(\sin\frac{11\pi}{28} - \sin\frac{3\pi}{28}\right)$

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

$\sin(6\theta)\cos(3\theta)$

$\sin(6\theta)\cos(3\theta) = \frac{1}{2}[\sin(9\theta) + \sin(3\theta)]$

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

13. Find the exact value of the product **sin** 37.5° **sin** 7.5°.

Which of the following is the exact value of **sin** 37.5° **sin** 7.5°?

- **A.** $\frac{\sqrt{3}-\sqrt{2}}{2}$
- **B.** $\frac{\sqrt{2}+1}{4}$
- ✔ **C.** $\frac{\sqrt{3}-\sqrt{2}}{4}$
- **D.** 75°

14. Find the exact value of the expression **sin** $165^\circ \cdot$ **cos** 75°.

Choose the correct answer below.

- **A.** 1
- **B.** $\frac{\sqrt{2}}{2}$
- **C.** $-\frac{\sqrt{3}}{2}$
- ✔ **D.** $\frac{1}{2}\left(-\frac{\sqrt{3}}{2}+1\right)$

15. Use the sum-to-product identities to rewrite the expression.

$\sin 14^\circ + \sin 6^\circ$

Which expression is equal to **sin** 14° + **sin** 6°?

- **A.** $2\cos 10^\circ \sin 4^\circ$
- **B.** $2\cos 10^\circ \cos 4^\circ$
- ✔ **C.** $2\sin 10^\circ \cos 4^\circ$
- **D.** $-2\sin 10^\circ \sin 4^\circ$

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

$\sin 3\alpha + \sin 6\alpha$

$\sin 3\alpha + \sin 6\alpha = 2\sin\left(\frac{9\alpha}{2}\right)\cos\left(\frac{3\alpha}{2}\right)$

(Use integers or fractions for any numbers in the expression.)

17. Identify the following equation as an identity, conditional, or inconsistent equation.

$\cos x = 3$

Choose the correct answer below.

- an identity
- a conditional equation
- ✔ an inconsistent equation

18. Identify the following equation as an identity, conditional, or inconsistent equation.

$\tan^2 x = \sec^2 x - 1$

Choose the correct answer below.

- ✔ an identity
- a conditional equation
- an inconsistent equation

19. Identify the following equation as an identity, conditional, or inconsistent equation. (Assume that $\sec x > 0$.)

$$\sec x = \sqrt{1 + \tan^2 x}$$

Choose the correct answer below.

- an identity ✔
- a conditional equation
- an inconsistent equation

20. Watch the video and then solve the problem given below.

Click here to watch the video.[1]

Find the exact value of $\cos\left(\frac{5\pi}{3}\right) \sin\left(\frac{7\pi}{3}\right)$.

$\cos\left(\frac{5\pi}{3}\right) \sin\left(\frac{7\pi}{3}\right) = \frac{\sqrt{3}}{4}$

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

1: http://mediaplayer.pearsoncmg.com/assets/v5lM9ASqV75SPyN42Qv1ASX64pguN3vR?clip=2

21. Watch the video and then solve the problem given below.

Click here to watch the video.[2]

Write the expression $\cos 7\theta - \cos 9\theta$ as a product of two trigonometric functions.

$\cos 7\theta - \cos 9\theta = 2 \sin(8\theta) \sin(2\theta)$ (Simplify your answer.)

2: http://mediaplayer.pearsoncmg.com/assets/v5lM9ASqV75SPyN42Qv1ASX64pguN3vR?clip=3