



November 20

SWBAT:

Simplify expressions using the sum-to-product and product-to-sum formulas



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

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

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

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

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

$$\cos u \cos v = \frac{1}{2} [\cos(u - v) + \cos(u + v)]$$

$$\cos x + \cos y = 2 \cos\left(\frac{x + y}{2}\right) \cos\left(\frac{x - y}{2}\right)$$

Rewrite

$$4 \sin\left(\frac{\pi}{3}\right) \cos\left(\frac{5\pi}{6}\right)$$

+ evaluate

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

$$= 4 \left[ \frac{1}{2} \left[ \sin\left(\frac{\pi}{3} + \frac{5\pi}{6}\right) + \sin\left(\frac{\pi}{3} - \frac{5\pi}{6}\right) \right] \right]$$

$$= 2 \left[ \sin\left(\frac{2\pi}{6} + \frac{5\pi}{6}\right) + \sin\left(\frac{2\pi}{6} - \frac{5\pi}{6}\right) \right]$$

$$2 \left[ \sin\left(\frac{7\pi}{6}\right) + \sin\left(\frac{-3\pi}{6}\right) \right]$$

$$2 \left[ \sin\left(\frac{7\pi}{6}\right) + \sin\left(\frac{-\pi}{2}\right) \right] = 2 \left( -\frac{1}{2} + -1 \right)$$

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

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

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

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

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

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

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

$$\cos x + \cos y = 2 \cos\left(\frac{x+y}{2}\right) \cos\left(\frac{x-y}{2}\right)$$

Rewrite  
 $\cos(2x)\cos(4x)$

$$\cos u \cos v = \frac{1}{2} [\cos(u-v) + \cos(u+v)]$$

$$u = 2x \quad v = 4x$$

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

$$= \frac{1}{2} (\cos(-2x) + \cos(6x))$$

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

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

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

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

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

$$\cos u \cos v = \frac{1}{2} [\cos(u-v) + \cos(u+v)]$$

$$\cos x + \cos y = 2 \cos\left(\frac{x+y}{2}\right) \cos\left(\frac{x-y}{2}\right)$$

Rewrite  
 $\sin(5m) + \sin(3m)$

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

$$x = 5m \quad y = 3m$$

$$= 2 \sin\left(\frac{5m+3m}{2}\right) \cos\left(\frac{5m-3m}{2}\right)$$

$$= 2 \sin(4m) \cos(m)$$

Rewrite  
 $\cos(m+n) + \cos(m)$

$$\cos x + \cos y = 2 \cos\left(\frac{x+y}{2}\right) \cos\left(\frac{x-y}{2}\right)$$

$$x = m+n \quad y = m$$

$$= 2 \cos\left(\frac{m+n+m}{2}\right) \cos\left(\frac{m+n-m}{2}\right)$$

$$= 2 \cos\left(\frac{2m+n}{2}\right) \cos\left(\frac{n}{2}\right)$$