Problem 4

In each of Problems 1 through 4, write the given expression as a product of two trigonometric functions of different frequencies.

\[ \sin 3t + \sin 4t \]

Solution

Recall the sum-to-product formula,

\[ \sin u + \sin v = 2 \sin \left( \frac{u + v}{2} \right) \cos \left( \frac{u - v}{2} \right). \]

Using this, the given expression becomes

\[ \sin 3t + \sin 4t = 2 \sin \left( \frac{3t + 4t}{2} \right) \cos \left( \frac{3t - 4t}{2} \right) \]

\[ = 2 \sin \frac{7t}{2} \cos \frac{t}{2}. \]