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

$$\begin{aligned} \sin 3t + \sin 4t &= 2 \sin\left(\frac{3t+4t}{2}\right) \cos\left(\frac{3t-4t}{2}\right) \\ &= 2 \sin \frac{7t}{2} \cos \frac{t}{2}. \end{aligned}$$