3.7 Products, Sums, Linear Combinations, and Applications

1. Using the sum-to-product formula:

$$\sin 9x + \sin 5x$$
$$\frac{1}{2}\left(\sin\left(\frac{9x+5x}{2}\right)\cos\left(\frac{9x-5x}{2}\right)\right)$$
$$\frac{1}{2}\sin 7x\cos 2x$$

2. Using the difference-to-product formula:

$$\cos 4y - \cos 3y$$
$$-2\sin\left(\frac{4y+3y}{2}\right)\sin\left(\frac{4y-3y}{2}\right)$$
$$-2\sin\frac{7y}{2}\sin\frac{y}{2}$$