MAT 155B - FALL 12 - EXAMPLES SECTION 7.2

Question. Compute the integral

$$\int \sin 7x \cos 3x \, dx$$

Solution. Recall that

$$\sin(a-b) = \sin a \cos b - \sin b \cos a$$
$$\sin(a+b) = \sin a \cos b + \sin b \cos a$$

Adding gives:

$$\sin(a-b) + \sin(a+b) = 2 \sin a \cos b,$$

or

$$\sin a \cos b = \frac{\sin(a-b) + \sin(a+b)}{2}$$

Put $a = 7x$ and $b = 3x$ to get

$$\sin 7x \cos 3x = \frac{\sin 4x + \sin 10x}{2}$$

Then

$$\begin{aligned} \int \sin 7x \cos 3x \, dx &= \frac{1}{2} \int (\sin 4x + \sin 10x) \, dx \\ &= \frac{1}{2}(-\frac{\cos 4x}{4} - \frac{\cos 10x}{10}) + C \\ &= -\frac{\cos 4x}{8} - \frac{\cos 10x}{20} + C \end{aligned}$$