

Useful trig. identities & integrals:

$$\sin(A \pm B) = \sin A \cos B \pm \sin B \cos A$$

$$\cos(A \pm B) = \cos A \cos B \mp \sin A \sin B$$

$$\rightarrow \frac{1}{2} (\cos(A-B) - \cos(A+B)) = \sin A \sin B$$

$$\frac{1}{2} (\cos(A+B) + \cos(A-B)) = \cos A \cos B$$

$$\frac{1}{2} (\sin(A+B) + \sin(A-B)) = \sin A \cos B$$

$$\int x \cos(ax) dx = \frac{1}{a^2} \cos ax + \frac{x}{a} \sin ax$$

$$\int x^2 \cos(ax) dx = \frac{2x \cos ax}{a^2} + \frac{a^2 x^2 - 2}{a^3} \sin ax$$

$$\int x \sin(ax) dx = -\frac{x \cos ax}{a} + \frac{\sin ax}{a^2}$$

$$\int x^2 \sin(ax) dx = \frac{2 - a^2 x^2}{a^3} \cos ax + \frac{2x \sin ax}{a^2}$$