

Some basic math formulas

$$\int_0^1 \sin(n\pi x)\sin(m\pi x)dx = 0 \quad , \text{ if } n \neq m$$

$$= 1/2 \quad , \text{ if } n = m \neq 0$$

$$= 0 \quad , \text{ if } n = m = 0$$

m & n are integers

$$\int_0^1 \cos(n\pi x)\cos(m\pi x)dx = 0 \quad , \text{ if } n \neq m$$

$$= 1/2 \quad , \text{ if } n = m \neq 0$$

$$= 1 \quad , \text{ if } n = m = 0$$

If both n and m are odd, or both n and m are even :

$$\int_0^1 \sin\left(\frac{n\pi x}{2}\right)\sin\left(\frac{m\pi x}{2}\right)dx = 0 \quad , \text{ if } n \neq m$$

$$= 1/2 \quad , \text{ if } n = m \neq 0$$

$$= 0 \quad , \text{ if } n = m = 0$$

m & n are integers

$$\int_0^1 \cos\left(\frac{n\pi x}{2}\right)\cos\left(\frac{m\pi x}{2}\right)dx = 0 \quad , \text{ if } n \neq m$$

$$= 1/2 \quad , \text{ if } n = m \neq 0$$

$$= 1 \quad , \text{ if } n = m = 0$$

$$\int \sin(x)dx = -\cos(x) \quad \int \cos(x)dx = \sin(x)$$

$$\frac{d}{dx}\sin(x) = \cos(x) \quad \frac{d}{dx}\cos(x) = -\sin(x)$$

$$\frac{d}{dx}\sinh(x) = \cosh(x) \quad \frac{d}{dx}\cosh(x) = \sinh(x)$$

$$\sin(n\pi) = 0, \quad n = 0, 1, 2, \dots$$

$$\sin(n\pi/2) = 1, \quad \text{if } n = 1, 5, 9, 13, \dots$$

$$= -1, \quad \text{if } n = 3, 7, 11, \dots$$

$$\cos(n\pi) = 1, \quad \text{if } n \text{ is even}$$

$$= -1, \quad \text{if } n \text{ is odd}$$

$$\cos(n\pi/2) = 0, \quad \text{if } n \text{ is odd}$$

$$\sin(-x) = -\sin(x) \quad \cos(-x) = \cos(x) \quad \sinh(-x) = -\sinh(x) \quad \cosh(-x) = \cosh(x)$$

$$\sinh(x) > 0 \quad \text{for } x > 0, \quad \sinh(0) = 0$$

$$\cosh(x) > 1 \quad \text{for } x > 0, \quad \cosh(0) = 1$$