Some formulas from Vector Calculus:
Green's Theorem:

$$\oint_C P\,\mathrm{dx} + Q\,\mathrm{dy} = \iint_R \left(\frac{\partial Q}{\partial x} - \frac{\partial P}{\partial y}\right) \mathrm{d}A$$

Divergence Theorem:

$$\oiint_S \vec{F} \cdot \hat{n}\ \mathrm{d}S\ = \iiint_V \nabla \cdot \vec{F}\ \mathrm{d}V$$

Stokes's Theorem:

$$\oint_C \vec{F} \cdot \mathrm{d}\vec{r} = \iint_S (\nabla \times \vec{F}) \cdot \hat{n}\,\mathrm{d}S$$

The following are true for any interger n:

$$\sin(n\pi) = 0, \qquad \cos(n\pi) = (-1)^n, \qquad \sin\left(\frac{(2n+1)\pi}{2}\right) = (-1)^n, \qquad \cos\left(\frac{(2n+1)\pi}{2}\right) = 0.$$

Some trigonometric formulas:

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

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

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

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

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

$$\cos^2 A = \frac{1}{2} + \frac{1}{2}\cos 2A$$

$$\sin^2 A = \frac{1}{2} - \frac{1}{2}\cos 2A$$

Some formulas from Fourier Series:

Let $f(x)$ be defined and piece-wise smooth on $\{x : 0 \le x \le 2L\}$. The **(Full) Fourier series** of $f(x)$ is given by :

$$f(x) \approx \frac{a_0}{2} + \sum_{n=1}^{\infty} \left(a_n \cos \frac{n\pi x}{L} + b_n \sin \frac{n\pi x}{L} \right)$$

$$a_n = \frac{1}{L} \int_c^{c+2L} f(x) \cos \frac{n\pi x}{L} \, dx$$

$$b_n = \frac{1}{L} \int_c^{c+2L} f(x) \sin \frac{n\pi x}{L} \, dx$$

Half-range expansions:

Let $f(x)$ be defined and piece-wise smooth on $\{x : 0 \le x \le L\}$.

The **Fourier Cosine series** of $f(x)$ is given by :

$$f(x) \approx \frac{a_0}{2} + \sum_{n=1}^{\infty} a_n \cos \frac{n\pi}{L} x$$

$$a_n = \frac{2}{L} \int_0^L f(x) \cos \frac{n\pi}{L} x \, dx$$

The **Fourier Sine series** of $f(x)$ is given by :

$$f(x) \approx \sum_{n=1}^{\infty} b_n \sin \frac{n\pi}{L} x$$

$$b_n = \frac{2}{L} \int_0^L f(x) \sin \frac{n\pi}{L} x \, dx$$

Other expansions:

Let $f(x)$ be defined and piece-wise smooth on $\{x : 0 \le x \le L\}$.

$$f(x) \approx \sum_{n=1}^{\infty} c_n \cos \frac{(2n-1)\pi}{2L} x$$

$$c_n = \frac{2}{L} \int_0^L f(x) \cos \frac{(2n-1)\pi}{2L} x \, dx$$

Let $f(x)$ be defined and piece-wise smooth on $\{x : 0 \le x \le L\}$.

$$f(x) \approx \sum_{n=1}^{\infty} d_n \sin \frac{(2n-1)\pi}{2L} x$$

$$d_n = \frac{2}{L} \int_0^L f(x) \sin \frac{(2n-1)\pi}{2L} x \, dx$$

Some trigonometric integrals:

You may use any of the following formulas without further explanation:
(k is a non-zero constant)

$$\int \cos kx \; dx = \frac{1}{k} \sin kx$$

$$\int x \cos kx \; dx = \frac{1}{k^2} \cos kx + \frac{x}{k} \sin kx$$

$$\int x^2 \cos kx \; dx = \frac{x^2}{k} \sin kx + \frac{2x}{k^2} \cos kx - \frac{2}{k^3} \sin kx$$

$$\int \sin kx \; dx = -\frac{1}{k} \cos kx$$

$$\int x \sin kx \; dx = \frac{1}{k^2} \sin kx - \frac{x}{k} \cos kx$$

$$\int x^2 \sin kx \; dx = -\frac{x^2}{k} \cos kx + \frac{2x}{k^2} \sin kx + \frac{2}{k^3} \cos kx$$