Chapter 1

Preamble

This is a precursor to the real class.

An example of the use of modelling, in a somewhat humourous approach is through the use of a girl and boy's love story.

Let's take two functions $G(t)$ and $B(t)$. These functions output the 'feelings' of the girl and the boy.

Then,

$$\frac{dG(t)}{dt} = cG(t) + dB(t)$$
$$\frac{dB(t)}{dt} = aB(t) \pm bG(t)$$

These constants represent some influence on the change in the feelings due to the current feelings you and your significant other can have.

Here's another example:

Model chocolate consumption and the way it leads to happiness. State the variables:

$$C(t) - \text{Chocolates consumed at a given day}$$
$$H(t) - \text{Happiness on a given day}$$

The model for these would work like this.

$$\frac{dC(t)}{dt} = \alpha C(t) + \beta H(t)$$
$$\frac{dH(t)}{dt} = \delta C(t) + \gamma H(t)$$

The amount of chocolate depends on our happiness as well as the chocolates already consumed.

Here's a more serious problem.

Modelling the COVID pandemic.

We can use three main variables:

$$A(t) - \text{Affected cases}$$
$$R(t) - \text{Recovered cases}$$
$$U(t) - \text{Non-Affected cases}$$

$$\text{Total no. of people} = A(t) + R(t) + U(t)$$