Exercise 7:

Part 1: Propose a model determining the terminal velocity of a raindrop falling from a stationary cloud.

Pre assumptions: The raindrop is spherical and its size and shape do not change significantly as it falls

It seems the velocity is directly related to the mass of the raindrop and gravitational acceleration and is inversely related to air drag. So, the proposed model can be approximated as:

As we know, at terminal velocity, these two forces are equal and opposite, resulting in a constant speed of descent. Dimensional analysis:

Part 2: Propose a model for the volume flow rate *dV/dt* of blood flowing in an artery as a function of the pressure *P* drop per unit length of artery, the radius *r*, the blood density *ρ* and the blood viscosity *µ.*

Pre assumptions: The flow of blood in the artery is not turbulent, and the artery is a straight, cylindrical tube with a constant radius.

So, the proposed model can be approximated as:

Dimensional analysis:

Exercise 8:

Write a code to solve the wave equations, given the initial and boundary conditions.

Wave equation:

For small :

The code is provided in the attached notebook.