Imagine you are driving a car. You want to drive the car at 50 km/hr.

Now say your speed is below 50 km/hr, then you would proportionally apply force on the accelerator so that you reach your desired speed. Say you cross your desired speed you would decelerate. This is a Proportional term in controller.

Now say the vehicle is climbing a slope. So here the accelerator must be pushed proportional to rate of drop of speed. So based on rate of drop of speed, accelerator must be presses. This is where derivative term comes into play. This is used to compensate the rate of change of error.

Now say the vehicle is running at a speed of 49.5 km/hr. This is a constant error so the derivative term is zero as there is no rate of change of error. The difference error i.e. 0.5 km/hr term is too small for the proportional error to compensate. To handle this kind of steady state error Integral term is used. It deals with error which is being constantly accumulated over a period of time.

Document is based on below video.

<https://www.youtube.com/watch?v=g7apd9a7Jxs&ab_channel=ABBValueProviderUK>

Much more elaborate description of PID can be found in the below video.

<https://www.youtube.com/watch?v=4Y7zG48uHRo&ab_channel=AerospaceControlsLab>