Numerical integration in Python

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Integration

- To find out the future position of a satellite we can integrate the equations of motion

$$\ddot{r} = -\frac{\mu}{r^2}\hat{r} \tag{1}$$

$$\dot{r} = \int \ddot{r} dt \tag{2}$$

$$r = \int \dot{r} dt \tag{3}$$

Integration

- For many problems it's very difficult/impossible to find an analytical solution
- We instead use numerical integration rather than trying to find the analytical solution (but we have the analytical solution for some cases of astrodynamics)

Numerical Integration