

$$\frac{dy}{dt} = ky$$

$$\int \frac{1}{y} \frac{dy}{dt} dt = \int k dt$$

$$\int \frac{1}{y} dy = \int k dt$$

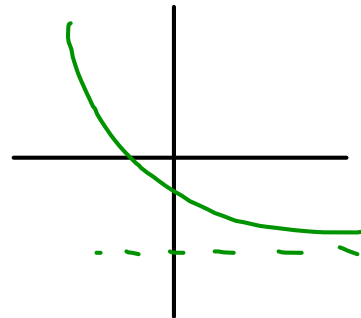
$$\ln|y| = kt + c$$

$$|y| = e^{kt+c}$$

$$y = \pm e^{kt+c}$$

$$y = \pm e^c e^{kt}$$

$$y = A e^{kt}$$



Let $A = \pm e^c$

$$\int \frac{9r^2}{\sqrt{1-r^3}} dr$$

$$\text{Let } u = 1 - r^3 \\ du = -3r^2 dr$$

$$-3 \int \frac{1}{\sqrt{1-r^3}} (-3r^2 dr)$$

$$-3 \int \frac{1}{\sqrt{u}} du$$

$$-3 \int u^{-\frac{1}{2}} du$$

$$-3 \left[2u^{\frac{1}{2}} \right] + C$$

$$-6\sqrt{1-r^3} + C$$

$$\int u^n du$$

$$\frac{u^{n+1}}{n+1} + C$$

$$-\frac{1}{2} \int_0^1 -2r \sqrt{1-r^2} \, dr$$

$$-\frac{1}{2} \int_1^0 u^{\frac{1}{2}} \, du$$

$$-\frac{1}{2} \left[\frac{2}{\frac{3}{2}} u^{\frac{3}{2}} \right]_1^0$$

$$-\frac{1}{2} \left(-\frac{2}{3} \right)$$

$$\text{Let } u = 1 - r^2$$

$$du = -2r \, dr$$

$$u = 1 - 0^2$$

$$= 1$$

$$u = 1 - 1^2$$

$$= 0$$

$$\frac{d^2 y}{dx^2} = 2 - 6x \quad y(0) = 1$$

$$y'(0) = 4$$

$$\frac{dy}{dx} = 2x - 3x^2 + C$$

$$\frac{dy}{dx} = 2x - 3x^2 + 4$$

$$y = x^2 - x^3 + 4x + C$$

$$y = x^2 - x^3 + 4x + 1$$