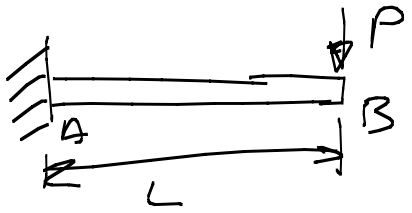
Problem 1

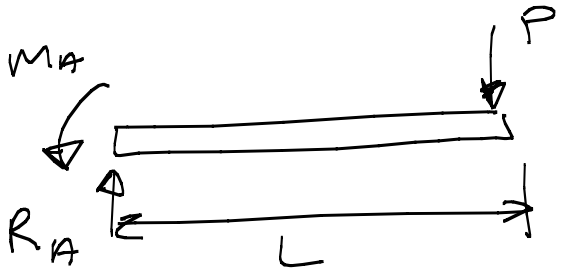
Derive the equation for the deflection Curve



$+\uparrow \Sigma F_y = 0 \Rightarrow \boxed{R_A = P}$

$+\circlearrowleft \Sigma M_A = 0 \Rightarrow M_A - PL = 0$

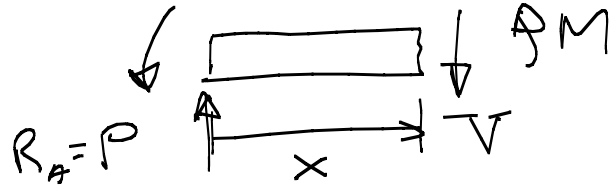
$\boxed{M_A = PL}$



$M_A = PL$

$+\circlearrowleft \Sigma M_{cut} \Rightarrow M + PL - Px = 0$

$EI\,v'' = \boxed{M = Px - PL}$



$$EI\,v' = \frac{1}{2}Px^2 - PLx + C_1$$

$$EI\,v = \frac{1}{6}Px^3 - \frac{1}{2}PLx^2 + C_1x + C_2$$

Boundary Conditions

$$v(x=0) = 0 \quad , v'(x=0) = 0$$

$v(0)=0$

$$0 = C_2 \qquad \boxed{C_2 = 0}$$

$v'(0)=0$

$$0 = C_1 \quad \Rightarrow \boxed{C_1 = 0}$$

$$EIv = \frac{1}{6}Px^3 - \frac{1}{2}PLx^2$$

$$\boxed{v = \frac{-Px^2}{6EI}(3L - x)}$$