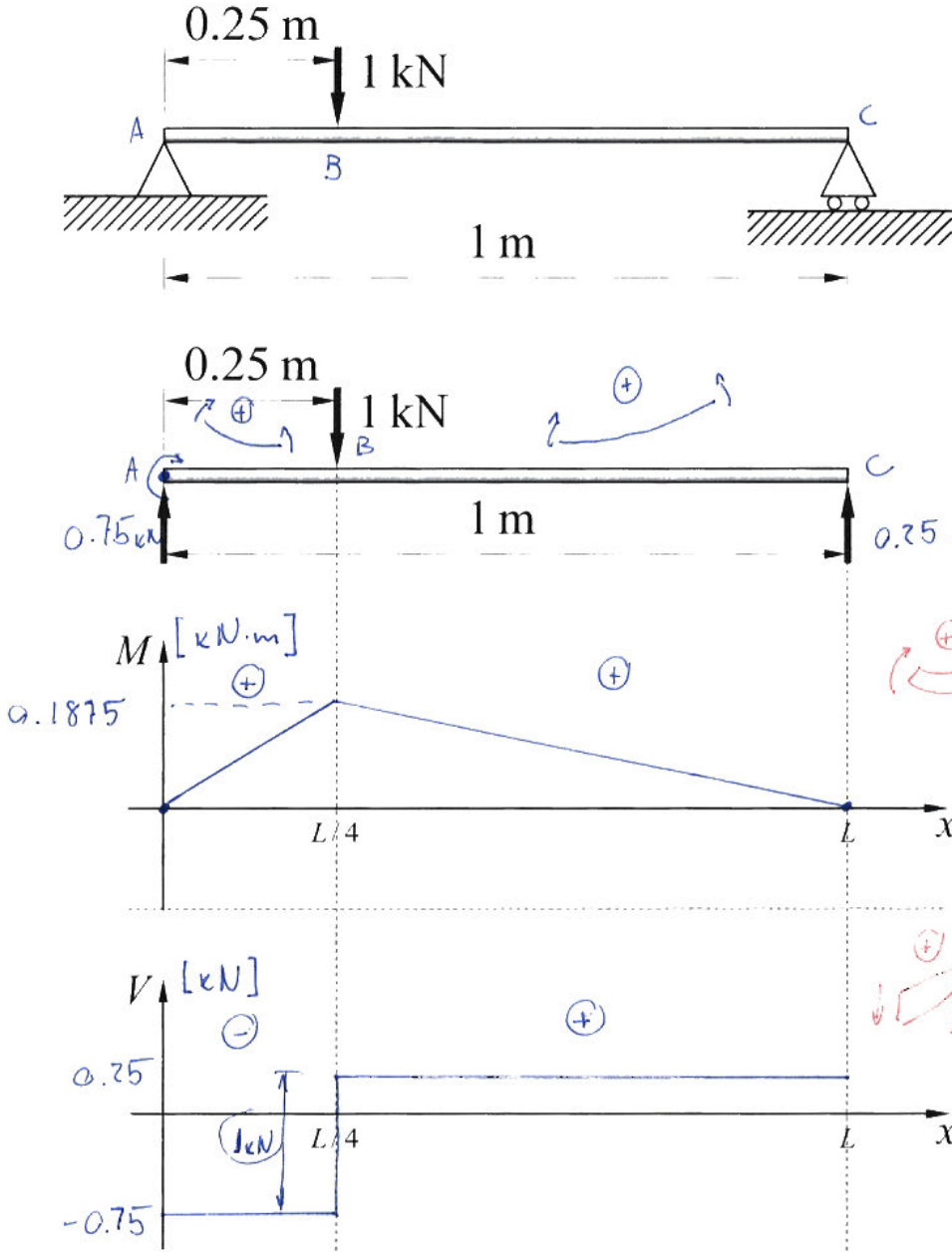
Example 2.1 – Plot the bending moment and shear force diagrams for the following beams:

a)



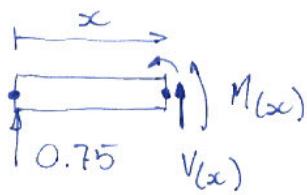
$$\Sigma M^{cw}_{@A} = 0 \quad \therefore \quad (1\,kN)(0.25\,m) - R_C(1\,m) = 0$$

$$\boxed{R_C = 0.25\,kN}$$

$$\Sigma F_y = 0 \qquad R_A + R_C - 1\,kN = 0$$

$$\boxed{R_A = 0.75\,kN}$$

Span AB :



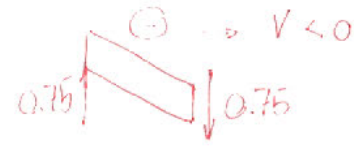
$$\Sigma M^{ccw}_{@x} = 0$$

$$M(x) - (0.75)(x) = 0$$

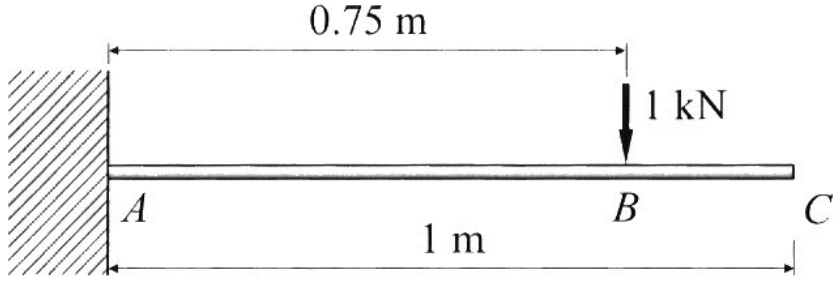
$$\boxed{M(x) = 0.75\,x}$$

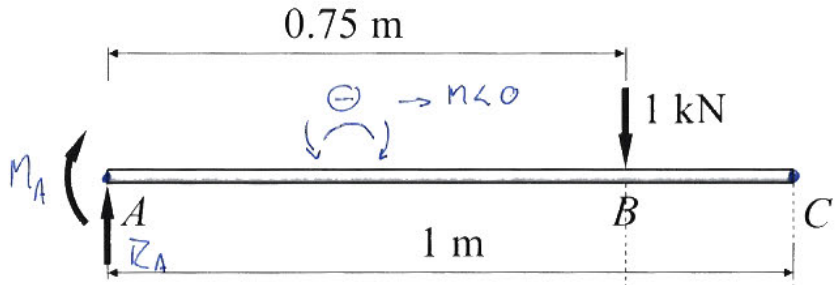
$$\Sigma F_y = 0 \quad \therefore \quad (0.75\,kN) + V(x) = 0$$

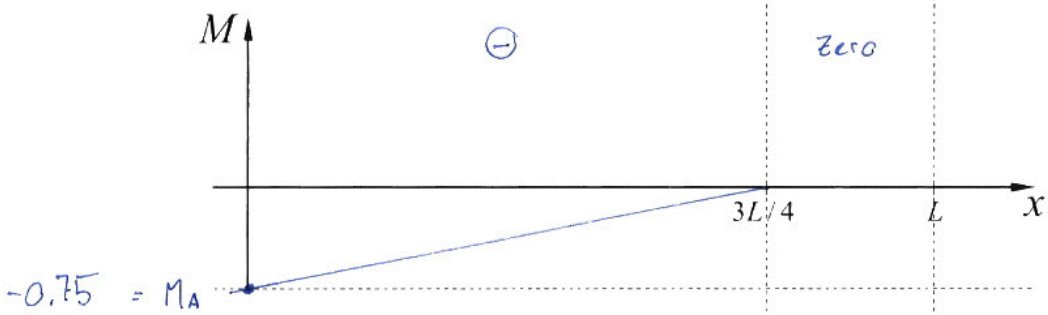
$$\therefore \boxed{V(x) = -0.75\,kN}$$

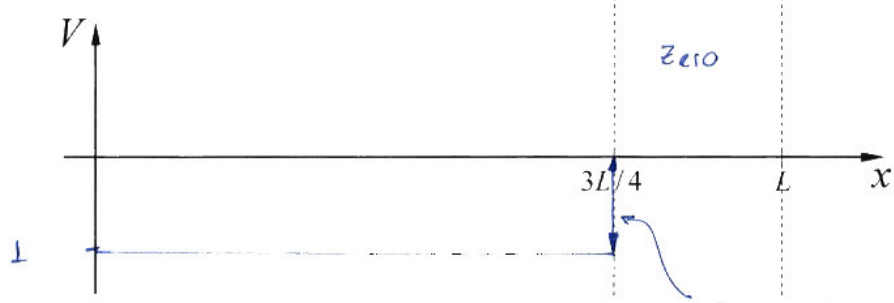


b)

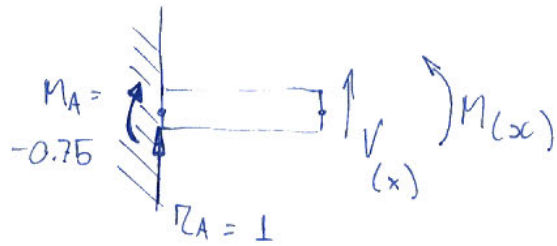








"Jump" in shear force must be equal to the magnitude of the point load!



$$\sum M_x^{ccw} = 0$$

$$M_{(x)} - M_A - R_A(x) = 0$$

$$M_{(x)} + 0.75 - 1x = 0$$

$$\boxed{M_{(x)} = x - 0.75}$$

So for $\begin{cases} x = 0, & M_{(x)} = -0.75 \text{ kNm} \\ M_{(x)} = 0, & x = 0.75 \text{ m} \end{cases}$

$$\sum M_{@A}^{cw} = 0 \quad \therefore \quad M_A + (1\text{kN})(0.75\text{m}) = 0$$

$$\boxed{M_A = -0.75 \text{ kNm}}$$

$$\sum F_y = 0 \quad \therefore \quad \boxed{R_A = 1 \text{ kN}}$$

c)