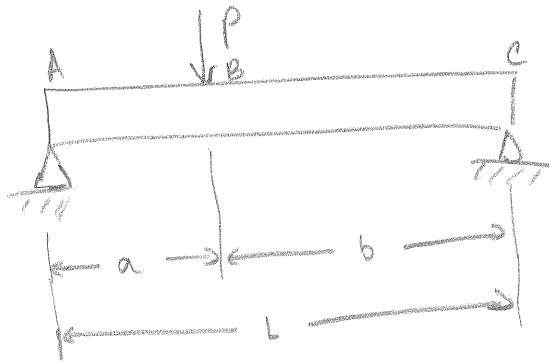


12.1)



a) Draw shear and moment diagrams

b) Find  $M(x)$ ,  $V(x)$



$$\sum F = -P + F_A + F_C = 0$$

$$\sum M_B = b F_C - a F_A = 0$$

$$F_C = \frac{a}{b} F_A$$

$$F_A + F_C = P = \left(1 + \frac{a}{b}\right) F_A$$

$$F_A = \frac{b}{a+b} P = \frac{bP}{L}, \quad F_C = \frac{aP}{L}$$

$0 < x < a \Rightarrow$

$$V(x) = F_A = \frac{bP}{L}$$

$$M(x) = \frac{bPx}{L}$$

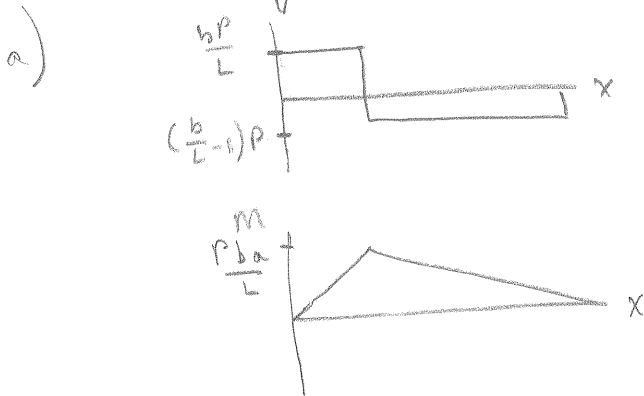


$$V(x) = F_A - P = \left(\frac{b}{L} - 1\right) P$$

$$M(x) = F_A x - P(x-a)$$

$$= \frac{bPx}{L} - P(x-a) = \frac{bPx - PxL + PaL}{L}$$

$$= \frac{-Pax + PaL}{L} = \frac{Pa(L-x)}{L}$$



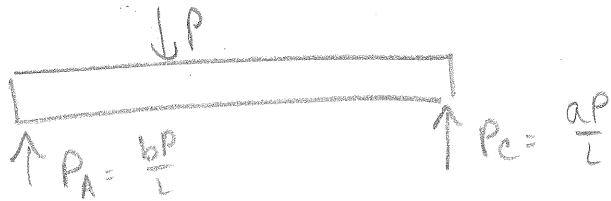
b)

$$V(x) = \begin{cases} \frac{bP}{L}, & 0 < x < a \\ \left(\frac{b}{L} - 1\right)P, & a < x < L \end{cases}$$

$$M(x) = \begin{cases} \frac{Pbx}{L}, & 0 < x < a \\ \frac{Pa}{L}(L-x), & a < x < L \end{cases}$$

or

using singularity functions



$$w = -\frac{bP}{L} \langle x \rangle^{-1} + P \langle x-a \rangle^{-1} - \frac{aP}{L} \langle x-L \rangle^{-1}$$

$$V(x) = -\int w dx = \frac{bP}{L} \langle x \rangle^0 - P \langle x-a \rangle^0 + \frac{aP}{L} \langle x-L \rangle^0$$

$$M(x) = \int V dx = \frac{bP}{L} \langle x \rangle^1 - P \langle x-a \rangle^1 + \frac{aP}{L} \langle x-L \rangle^1$$