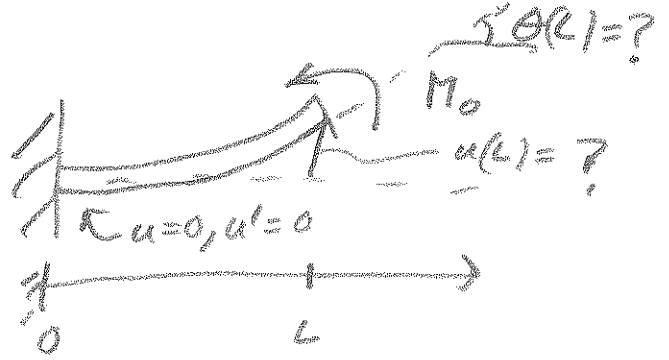
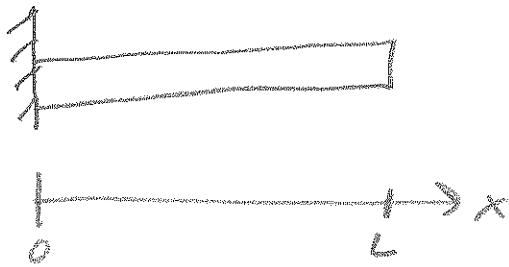
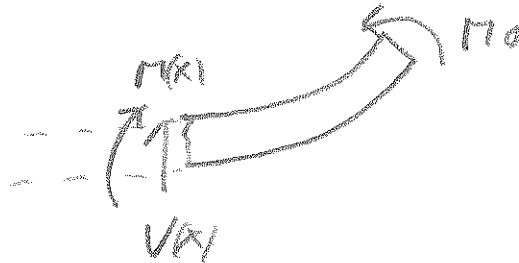


BJ 15.2



FBD w/ cut at x



$$\sum F = 0 \Rightarrow V = 0, \quad \sum M_L = 0 \Rightarrow M(x) = M_0$$

This is the easiest beam deflection problem!

$$EI u'' = M = M_0 \quad \leftarrow \text{const}$$

$$\Rightarrow EI u' = EI \int_0^x u''(x') dx' = M_0 x + C_1$$

$$u'(0) = 0 \Rightarrow C_1 = 0$$

$$\Rightarrow EI u = EI \int_0^x u'(x') dx' = M_0 x^2 / 2 + C_2$$

$$u(0) = 0 \Rightarrow C_2 = 0$$

$$u(L) = \frac{M_0 x^2 / 2}{EI} \Big|_L = \frac{M_0 L^2}{2EI}$$

$$u'(L) = \frac{M_0}{EI} \times L = \frac{M_0 L}{EI}$$

→ For a couple:

$$u \propto L^2$$

→ For a const. load:

$$u \propto L^3$$

→ For a dist. load:

$$u \propto L^4$$

(4th power!)