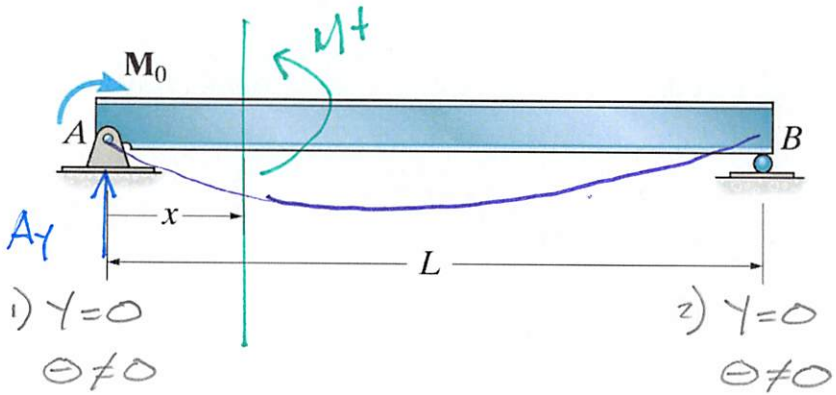
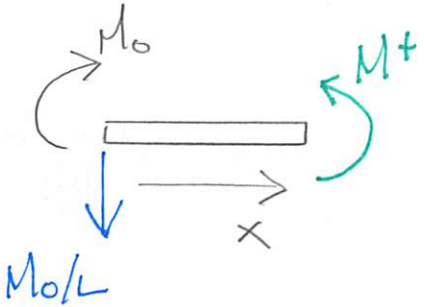
Example 7a-4: Determine the equations for slope and displacement in the following beam.



$$\circlearrowleft +\sum M_B = 0 = -M_0 - A_y(L) \qquad A_y = -\frac{M_0}{L}$$



$$\circlearrowleft +\sum M_{CUT} = 0 = M - M_0 + \frac{M_0}{L}x \qquad \underline{M(x) = M_0 - \frac{M_0}{L}x}$$

$$\theta = \int \frac{M}{EI}dx = \frac{M_0}{EI}\int \left(1 - \frac{x}{L}\right)dx = \frac{M_0}{EI}\left[x - \frac{x^2}{2L}\right] + C_1$$

$$Y = \int \theta dx = \frac{M_0}{EI}\left[\frac{x^2}{2} - \frac{x^3}{6L}\right] + C_1 x + C_2$$

$$\underline{Y(x=0) = 0 = C_2}$$

$$Y(x=L) = 0 = \frac{M_0 L^2}{3EI} + C_1 L$$

$$\underline{C_1 = -\frac{M_0 L}{3EI}}$$