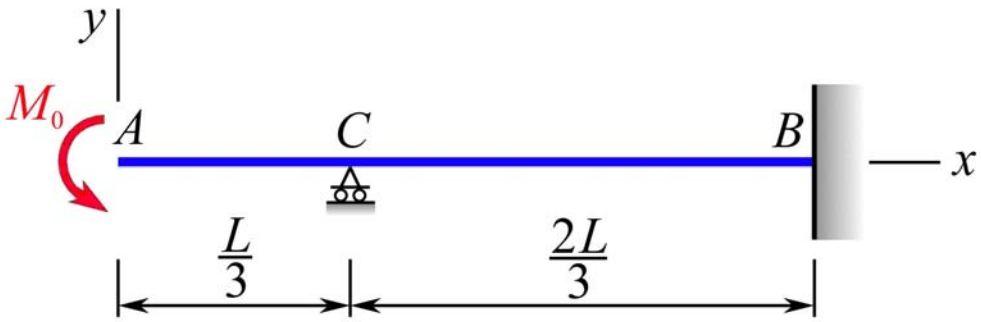
MEEG 3013 Quiz #8.m23.082

The beam shown has a constant *EI*. Using *singularity functions*, determine (*a*) the reaction $\mathbf{C}_y$ at *C*, (*b*) the slope y'_A at *A*, (*c*) the deflection y_A at *A*.



$$q = -M_0 \langle x \rangle^{-2} + C_y \langle x - \frac{L}{3} \rangle^{-1} \quad ①$$

$$EIy' = -M_0 \langle x \rangle^{1} + \frac{1}{2} C_y \langle x - \frac{L}{3} \rangle^{2} + C_1 \quad ①$$

$$EIy = -\frac{1}{2} M_0 \langle x \rangle^{2} + \frac{1}{6} C_y \langle x - \frac{L}{3} \rangle^{3} + C_1 x + C_2 \quad ①$$

Boundary conditions: ③

① $y(L/3) = 0$: $\quad 0 = -\frac{1}{2} M_0 (L/3)^2 + C_1 (L/3) + C_2$

② $y'(L) = 0$: $\quad 0 = -M_0 L + \frac{1}{2} C_y (2L/3)^2 + C_1$

③ $y(L) = 0$: $\quad 0 = -\frac{1}{2} M_0 L^2 + \frac{1}{6} C_y (2L/3)^3 + C_1 L + C_2$

$$C_1 = \frac{M_0 L}{2} \qquad C_2 = -\frac{M_0 L^2}{9} \qquad C_y = \frac{9 M_0}{4L}$$

$\mathbf{C}_y = \dfrac{9 M_0}{4L} \uparrow$ ② $\qquad y'_A = \dfrac{M_0 L}{2EI}$ ① $\qquad y_A = -\dfrac{M_0 L^2}{9EI}$ ①