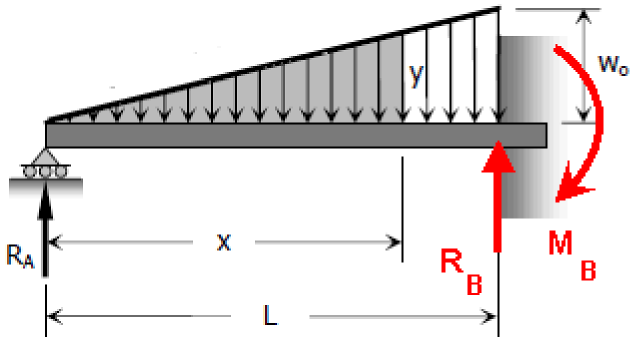
HW 9 Mech 417 Assigned 2/21/2019 due 3/7/2019



$$R_A = \frac{w_o L}{10}$$

Thus, the deflection equation is

$$EIy = \frac{R_A x^3}{6} - \frac{w_o x^5}{120L} + \left(\frac{w_o L^3}{24} - \frac{R_A L^2}{2}\right) x$$

A propped statically indeterminate cantilever beam is even easier to solve than the first example because the only unknown displacement is the rotation at the left end. Of course there are now three reactions to recover. The cubic beam element approximation is

$$\frac{EI}{L^3}\left[\begin{array}{cc|cc} 12 & 6L & -12 & 6L \\ 6L & 4L^2 & -6L & 2L^2 \\ \hline -12 & -6L & 12 & -6L \\ 6L & 2L^2 & -6L & 4L^2 \end{array}\right] \left\{\begin{array}{c} v_1 \\ \theta_1 \\ \hline v_2 \\ \theta_2 \end{array}\right\} = \frac{WL}{2}\left\{\begin{array}{c} 3/10 \\ L/15 \\ \hline 7/10 \\ -L/10 \end{array}\right\} + \left\{\begin{array}{c} F_1 \\ 0 \\ F_2 \\ M_2 \end{array}\right\}$$

Determine the element end slope and the three reactions. Check the reactions with a free body diagram and Newton's equations of equilibrium.

Mech 517 Also graph the moment and shear along with their exact values obtained from the above deflection equation.