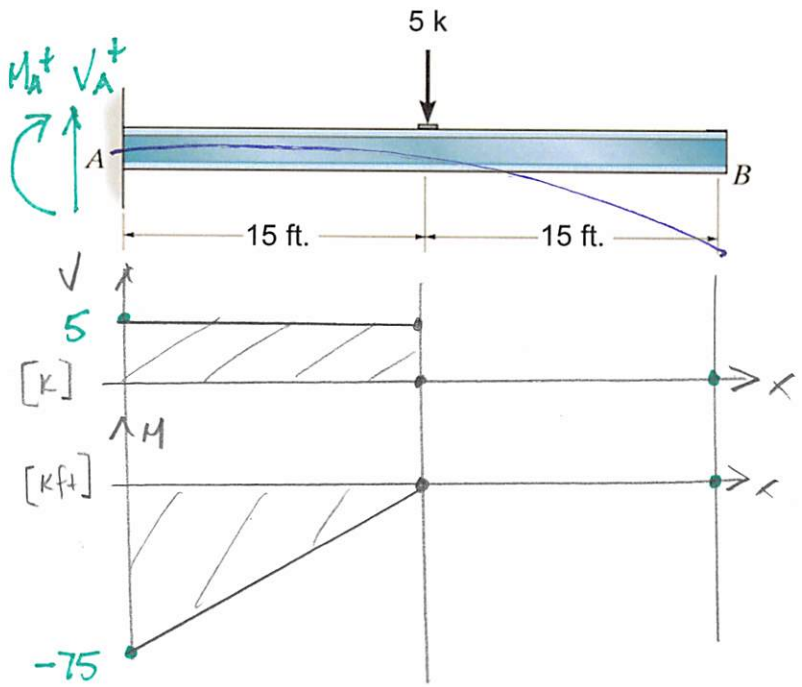
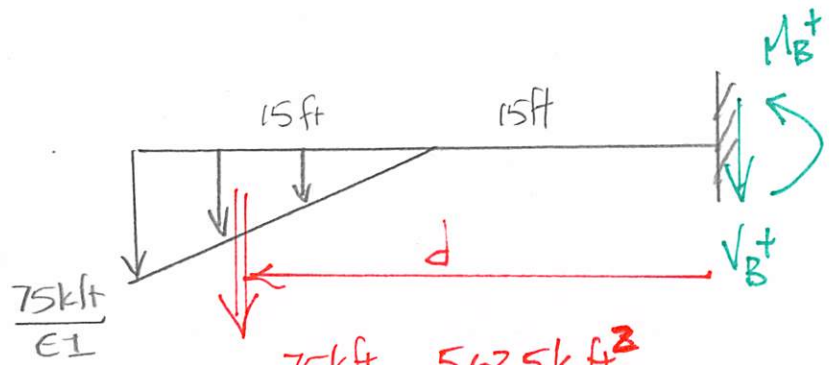
Example 7b-1: Determine the slope and the displacement at point B for the beam. Assume that E = 30,000 ksi and I = 800 in^4.



$\circlearrowleft^+ \Sigma M_A = 0 = -M_A - 5^k(15\,ft)$ $\quad M_A = -75\,k\,ft$

$+\uparrow \Sigma F_y = 0 = V_A - 5^k$ $\quad V_A = 5^k$

CONJUGATE BEAM



$F = \frac{1}{2}(15ft)\frac{75kft}{EI} = \frac{562.5k\,ft^2}{EI}$

$d = 15ft + \frac{2}{3}(15ft) = 25ft$

$\circlearrowleft^+ \Sigma M_B = 0 = M_B + Fd$ $\quad M_B = -Fd = \frac{-14{,}062.5\,k\,ft^3}{EI}$

$$Y_B = -\frac{14{,}062.5\,k\,ft^3}{30{,}000\,K}\left|\frac{in^2}{800\,in^4}\right|\frac{(12in)^3}{ft^3}$$

$= 1.01\ in$

$+\uparrow \Sigma F_y = 0 = -V_B - F$ $\quad V_B = -F = -\frac{562.5\,k\,ft^2}{EI}$

$$\Theta_B = -\frac{562.5\,k\,ft^2}{30{,}000\,K}\left|\frac{in^2}{800\,in^4}\right|\left(\frac{12in}{ft}\right)^2$$

$= 0.0034$ RADIANS