ME 323: Mechanics of Materials ***Homework Set H13***

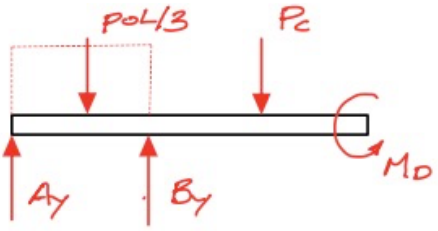
Summer 2024 ***Assigned/Due: June 26/June 28***

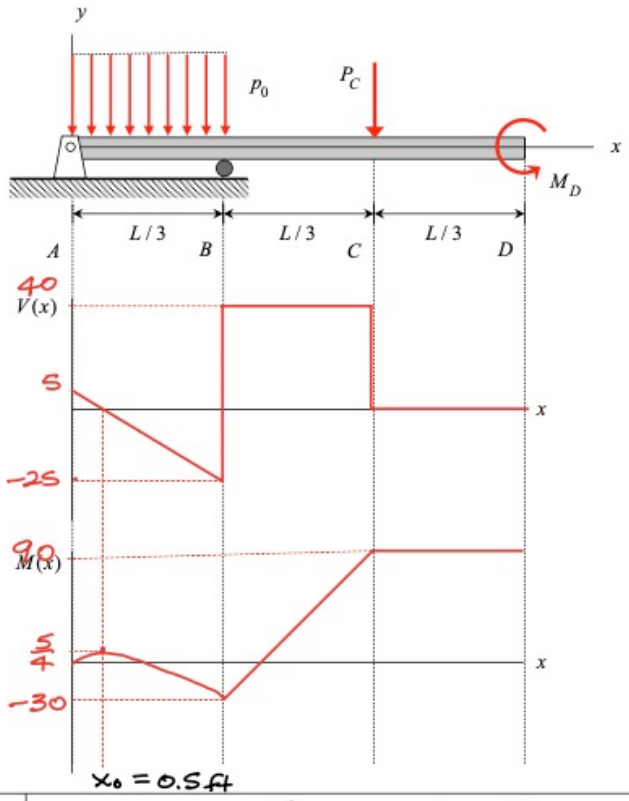
Consider the loading on the beam shown below.

a) Determine the reactions at supports A and B.

b) Sketch the shear force $V(x)$ and bending moment $M(x)$ distribution on the beam using the axes below. Provide details on your calculations.

Use the following in your calculations: $L = 9\,ft$, $p_0 = 10\,kips/ft$, $P_C = 40\,kips$ and $M_D = 90\,ft \cdot kips$.





- $\sum M_A = B_y(3) - (40)(6) - \left[\frac{(10)(9)}{3}\right]\left(\frac{3}{2}\right) + 90 = 0$

  ↳ $B_y = 65$ kips

- $\sum F_y = -\frac{(10)(9)}{3} + B_y - 40 + A_y = 0$

  ↳ $A_y = 40 - 65 + 30 = 5$ kips

$V(3^-) = V(0) + (-10)(3)$

$= 5 - 30 = -25$

$V(3^+) = V(3^-) + B_y = 40$

$V(x_0) = V(0) + (-10)x_0 = 0$

↳ $x_0 = 0.5$ ft

$V(6^-) = V(3^+) = 40$

$V(6^+) = V(6^-) - 40 = 0$

$V(9) = V(6^+) = 0$ ✓ (checks)

$M(x_0) = M(0) + \frac{1}{2}(5)\left(\frac{1}{2}\right) = \frac{5}{4}$

$M(3) = M(x_0) + \frac{1}{2}(-25)(2.5) = -30$

$M(6) = M(3) + (40)(3) = 90$

$M(9) = M(6) = 90$ ✓ (checks)