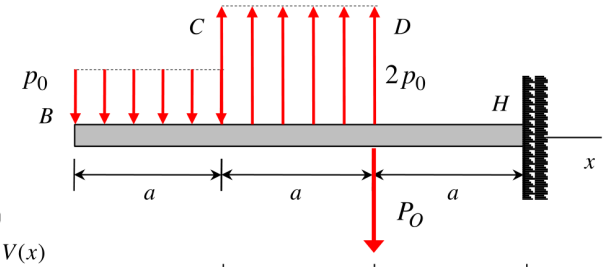
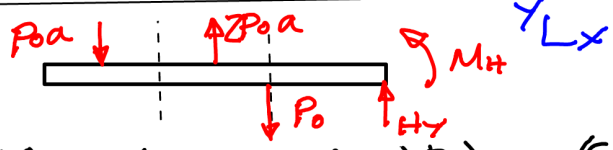
Determine the shear force and bending moment diagrams in the plot axes below for the loaded beam shown. Clearly indicate the values of V and M at the labeled points as well as any maximum/minimum values. Please provide details on your work. Use $p_0 = 20lb/in$, $a = 2in$ and $P_0 = 40lb$.



Determine reactions



$\Sigma M_H = M_H + P_0a - (2p_0a)\left(\frac{3a}{2}\right) + p_0a\left(\frac{5a}{2}\right) = 0$

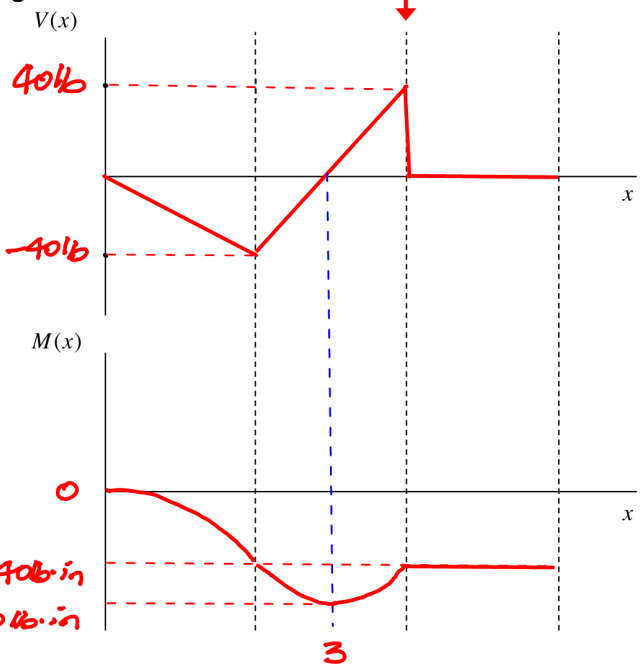
$\hookrightarrow M_H = -P_0a + \frac{1}{2}p_0a^2 = -40\ lb\cdot in$

$\Sigma F_x = -p_0a + 2p_0a - P_0 + H_y = 0$

$\hookrightarrow H_y = P_0 - p_0a = 0$

Shear force

- $V(0) = 0$
- $V(2) = V(0) + (-p_0)(a) = -40\ lb$
- $V(4^-) = V(2) + (2p_0)(a) = 40\ lb$
- $V(4^+) = V(4^-) - P_0 = 0$
- $V(6) = V(4^+) + 0 = 0$ ✓



Bending moment

- $M(0) = 0$
- $M(2) = M(0) + \frac{1}{2}(-40)(2) = -40$
- Since $V(3) = 0 \Rightarrow \frac{dM}{dx}(3) = 0$ & $M(3) = M(2) + \frac{1}{2}(-40)(1) = -60$
- $M(4) = M(3) + \frac{1}{2}(40)(1) = -40$
- $M(6) = M(4) + 0 = -40$ ✓