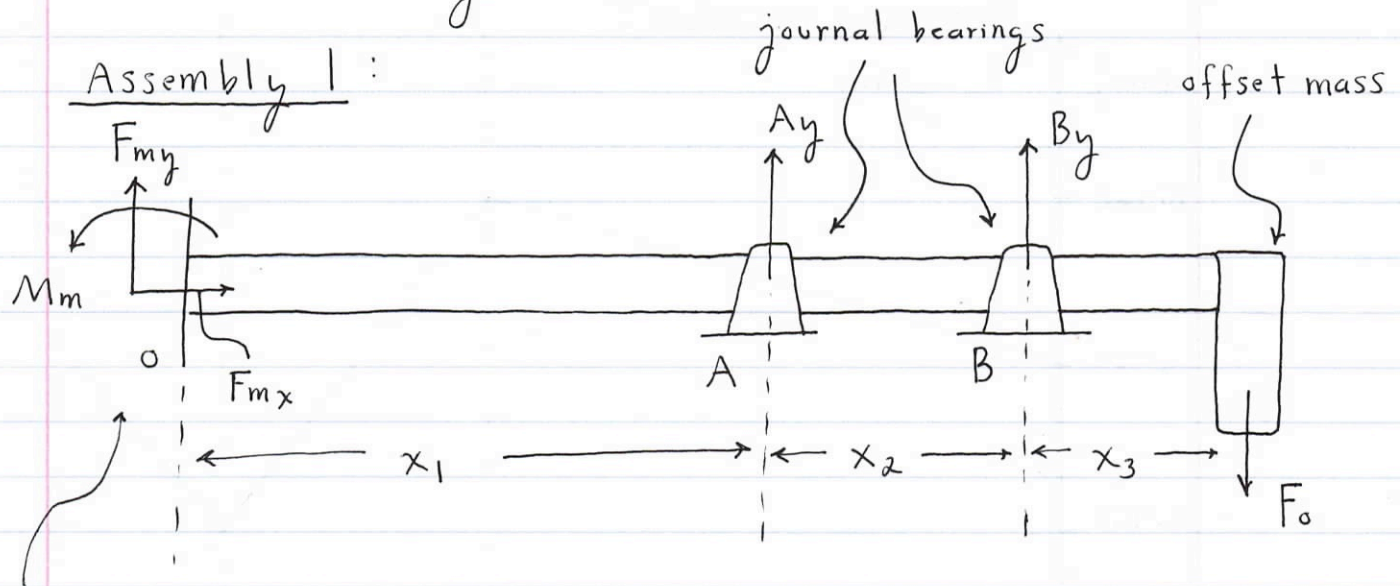


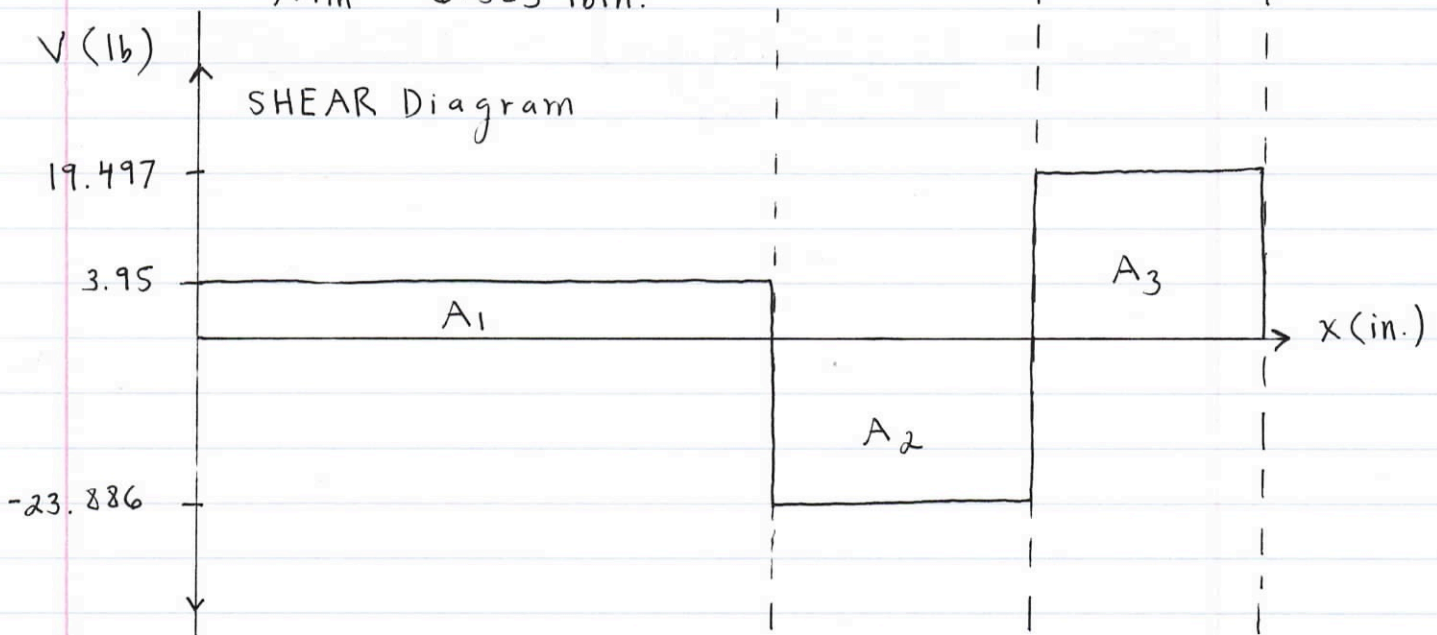
Bending Stresses in Shaft (Assem. 1)



Motor (fixed)

$x_1 = 5 \text{ in}$, $x_2 = 3 \text{ in}$, $x_3 = 3 \text{ in}$.
 for Offset Mass 3: $F_o (w_{n1}) = 19.497 \text{ lbf}$

$A_y = -27.836 \text{ lb}$, $B_y = 43.383 \text{ lb}$, $F_{my} = 3.95 \text{ lb}$,
 $M_m = 6.583 \text{ lbin.}$

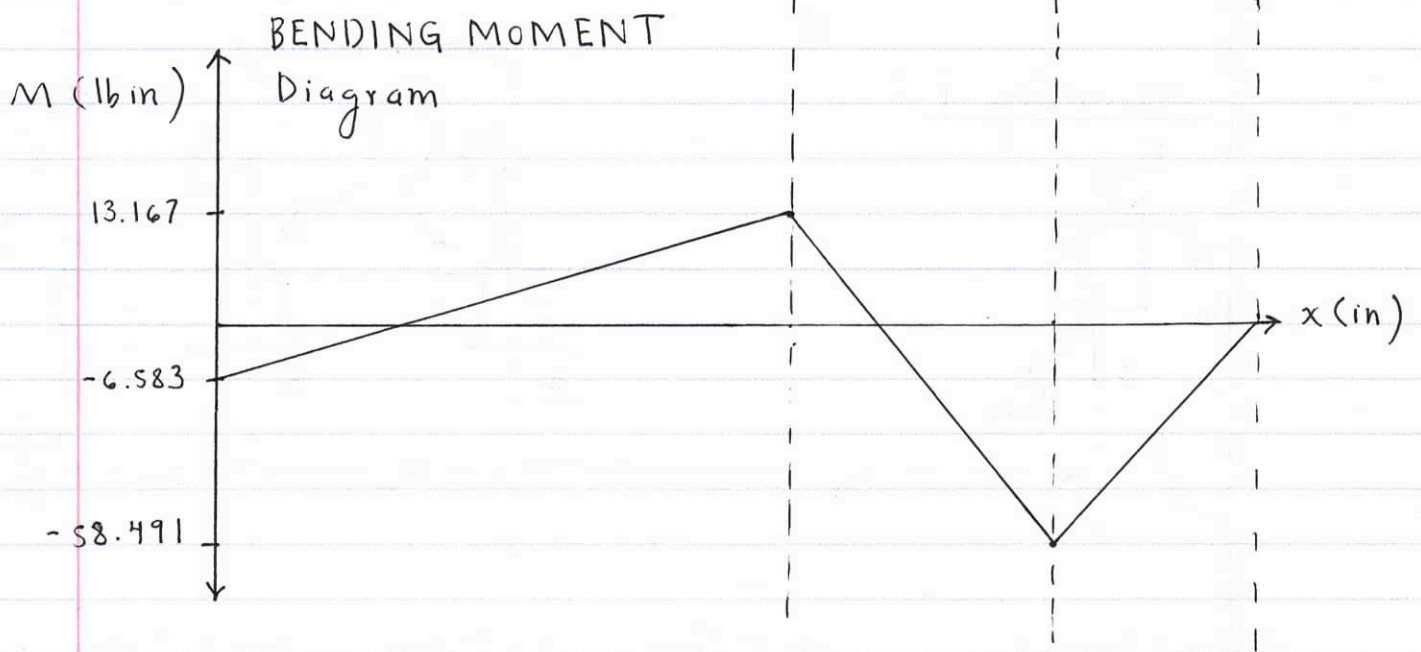


$A_1 = (3.95 \text{ lb})(5 \text{ in}) = 19.75 \text{ lbin}$

$A_2 = (-23.886 \text{ lb})(3 \text{ in}) = -71.658 \text{ lbin}$

$A_3 = (19.497 \text{ lb})(3 \text{ in}) = 58.491 \text{ lbin}$

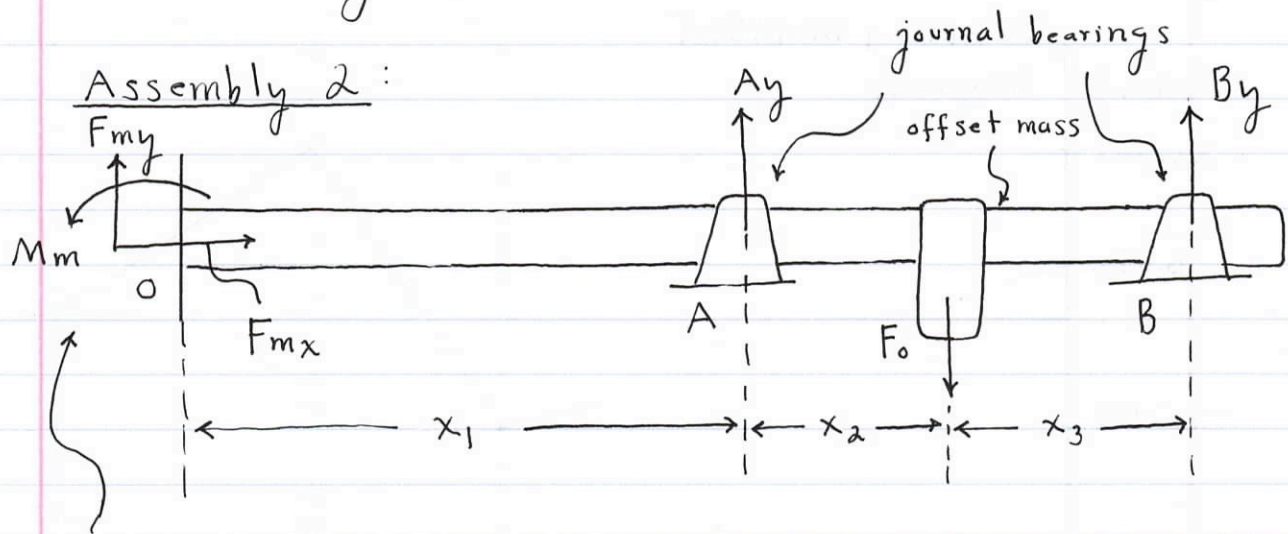
Bending Moment Diagram ∇



for solid round bar, $\sigma = \frac{32M}{\pi d^3}$

$$\sigma_{\max} = \frac{32 (58.491 \text{ lb in})}{\pi (0.5 \text{ in})^3} = \underline{4766.275 \text{ lb/in}^2}$$

Bending Stresses in Shaft (Assem. 2)



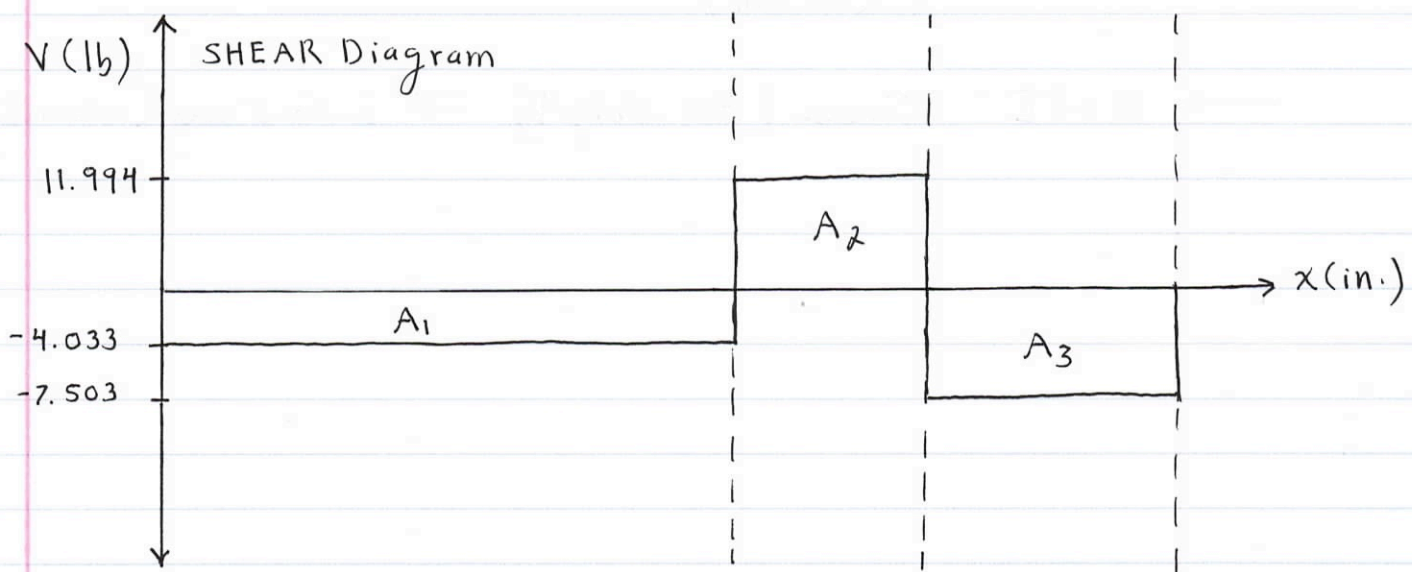
Motor (fixed)

$$x_1 = 5 \text{ in}, \quad x_2 = 3 \text{ in}, \quad x_3 = 3 \text{ in}.$$

for Offset Mass 3: $F_o (w_{n1}) = 19.497 \text{ lbf}$

$$\rightarrow A_y = 16.027 \text{ lb}, \quad B_y = 7.503 \text{ lb}, \quad F_{my} = -4.033 \text{ lb},$$

$$M_m = -6.692 \text{ lbin}$$

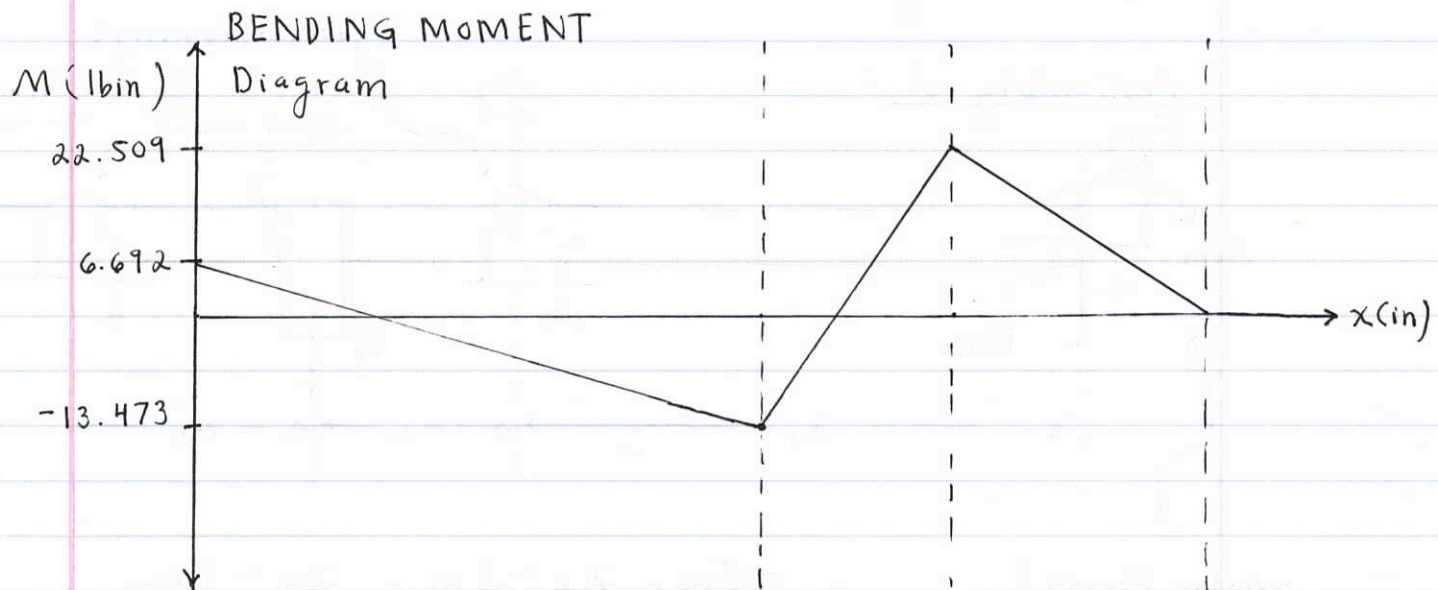


$$A_1 = (-4.033 \text{ lb})(5 \text{ in}) = -20.165 \text{ lbin}$$

$$A_2 = (11.994 \text{ lb})(3 \text{ in.}) = 35.982 \text{ lbin}$$

$$A_3 = (-7.503 \text{ lb})(3 \text{ in.}) = -22.509 \text{ lbin}$$

Bending Moment Diagram \rightarrow



for solid round bar, $\sigma = \frac{32M}{\pi d^3}$

$$\sigma_{\max} = \frac{32(22.509 \text{ lbin})}{\pi (0.5 \text{ in})^3} = \underline{1834.198 \text{ lb/in}^2}$$

→ NOTE: $\sigma_{\max}(\text{Assembly 1}) \approx 2.6 \sigma_{\max}(\text{Assembly 2})$