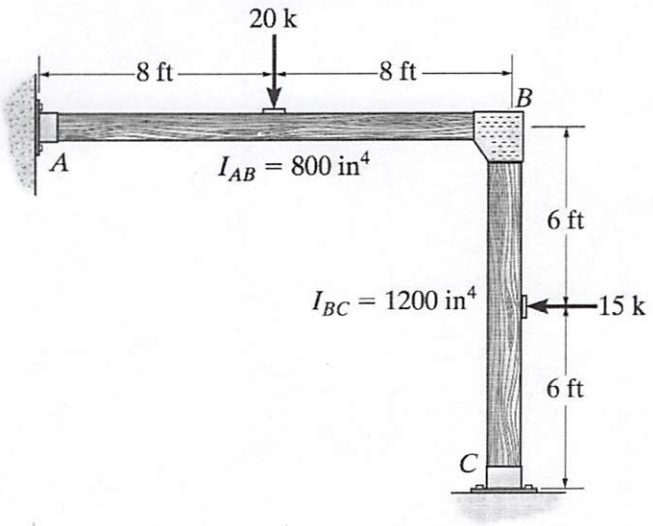
CIVL 4122 Quiz #5 F24 Name: _____

Determine the moments at the supports. Assume *A* and *C* are fixed, and *E* is constant.



$$FEM_{AB} = \frac{PL}{8} = \pm\frac{20k(16')}{8} = \pm 40k\text{-}ft$$

$$FEM_{BC} = \frac{PL}{8} = \pm\frac{15k(12')}{8} = \pm 22.5k\text{-}ft$$

$$I_{BC} = \frac{3}{2} I_{AB}$$

$$M_{AB} = \frac{2EI_{AB}}{16'}\left[\theta_B\right] - 40k\text{-}ft \quad (1)$$

$$M_{BA} = \frac{2EI_{AB}}{16'}\left[2\theta_B\right] + 40k\text{-}ft \quad (2)$$

$$M_{BC} = \frac{2E(3/2\, I_{AB})}{12'}\left[2\theta_B\right] - 22.5k\text{-}ft \quad (3)$$

$$M_{CB} = \frac{2E(3/2\, I_{AB})}{12'}\left[\theta_B\right] + 22.5k\text{-}ft \quad (4)$$

JOINT B

$$M_{BA} + M_{BC} = 0 \quad (5)$$

$$M_{BA} + M_{BC} = 0 = \frac{2EI_{AB}}{16'}\left[2\theta_B\right] + 40k\text{-}ft + \frac{6EI_{AB}}{24'}\left[2\theta_B\right] - 22.5k\text{-}ft$$

$$3/4\,\theta_B = -\frac{17.5k\text{-}ft^2}{EI_{AB}}$$

$$\theta_B = -\frac{70k\text{-}ft^2}{3EI_{AB}}$$

$$M_{AB} = \frac{2EI_{AB}}{16'}\left[\theta_B\right] - 40kft = \underline{-42.72kft}$$

$$M_{BA} = \frac{2EI_{AB}}{16'}\left[2\theta_B\right] + 40kft = \underline{34.17kft}$$

$$M_{BC} = \frac{2E(3/2 I_{AB})}{12'}\left[2\theta_B\right] - 22.5kft = \underline{-34.17kft}$$

$M_{BA} + M_{BC} = 0$

$$M_{CB} = \frac{2E(3/2 I_{AB})}{12'}\left[\theta_B\right] + 22.5kft = \underline{16.67kft}$$