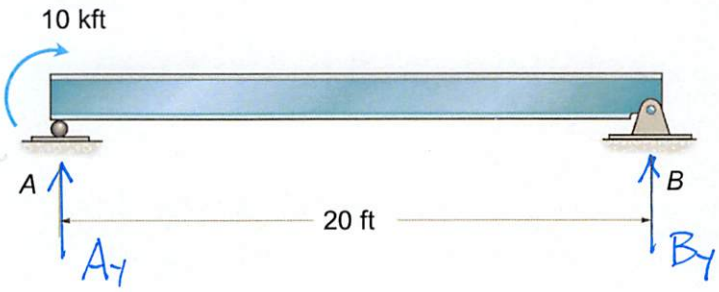
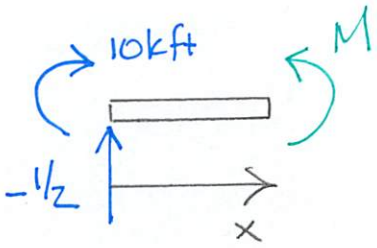
CIVL 3121 Quiz #8 S25 Name: _____

Write the virtual work expression for the displacement at x = 10 ft. Assume EI is constant.



$$\circlearrowleft^{+}\sum M_B = 0 = -10\,\text{kft} - A_y(20\,\text{ft})$$

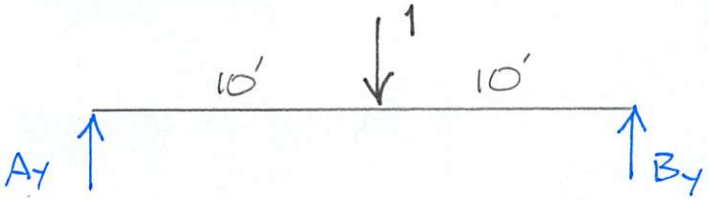
$$A_y = -1/2$$



$$\circlearrowleft^{+}\sum M_{CUT} = 0 = M + 1/2\,x - 10\,\text{kft}$$

$$M = \left[10 - \frac{x}{2}\right]\text{kft}$$

VIRTUAL LOAD



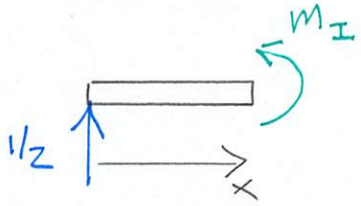
$$\circlearrowleft^{+}\sum M_B = 0 = 1(10') - A_y(20')$$

$$A_y = 1/2$$

$$+\uparrow\sum F_y = 0 = A_y + B_y - 1$$

$$B_y = 1/2$$

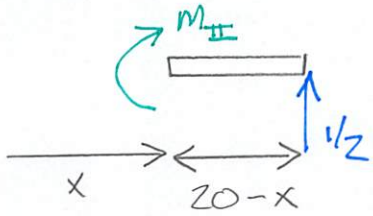
$0 \le x \le 10$



$$\circlearrowleft^{+}\sum M_{CUT} = 0 = m_I - 1/2\,x$$

$$m_I = \frac{x}{2}$$

$10 \le x \le 20$



$$\circlearrowleft^{+}\sum M_{CUT} = 0$$

$$= -m_{II} + \frac{1}{2}(20 - x)$$

$$m_{II} = \frac{1}{2}(20 - x)$$

$$Y_{x=10} = \frac{1}{EI}\left[\int_0^{10} M m_I\,dx + \int_{10}^{20} M m_{II}\,dx\right]$$