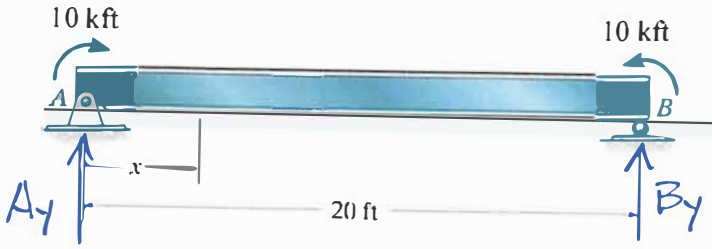
CIVL 3121 Quiz #8 S26

Name: _____

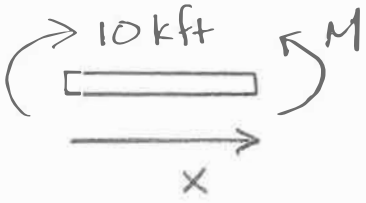
Write the virtual work expression for the displacement at x = 10 ft. Assume EI is constant.



$\circlearrowleft + \sum M_B = 0 = 10\text{k ft} - 10\text{k ft} - A_y(20')$

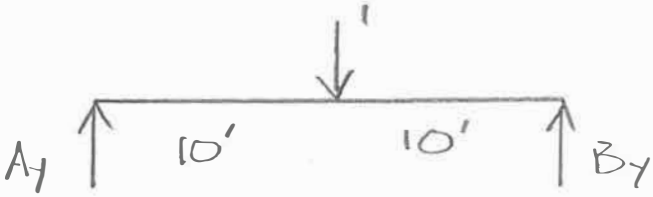
$A_y = 0$

REAL MOMENT $\quad 0 \le x \le 20$



$\circlearrowleft + \sum M_{CUT} = 0 = M - 10\text{k ft} \qquad M = 10\text{k ft}$

VIRTUAL MOMENT

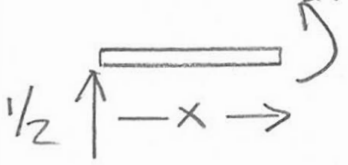


$\circlearrowleft + \sum M_B = 0 = 1(10') - A_y(20')$

$A_y = 1/2$

$+\uparrow \sum F_y = 0 = A_y + B_y - 1 \qquad B_y = 1/2$

$0 \le x \le 10$

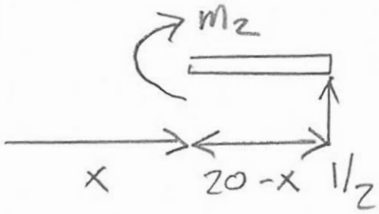


$\circlearrowleft + \sum M_{CUT} = 0$

$= m_1 - 1/2(x)$

$m_1 = \frac{x}{2}$

$10 \le x \le 20$



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

$= -m_2 + \frac{1}{2}(20 - x)$

$m_2 = \frac{1}{2}(20 - x)$

$$\gamma(x=10) = \frac{1}{EI}\left[\int_0^{10} 10\left(\frac{x}{2}\right)dx + \int_{10}^{20} 10\left(\frac{1}{2}\right)(20-x)\,dx\right]$$