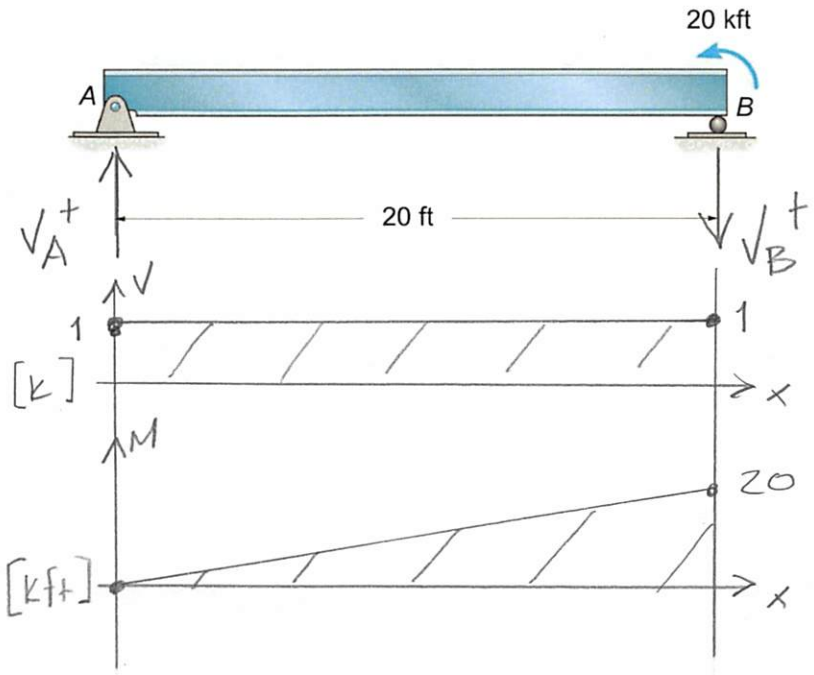
CIVL 3121 Quiz #7 S26 Name: _____

Use the conjugate beam method to determine the mid-span displacement and the slope at *A* for the beam below. *EI* is constant.



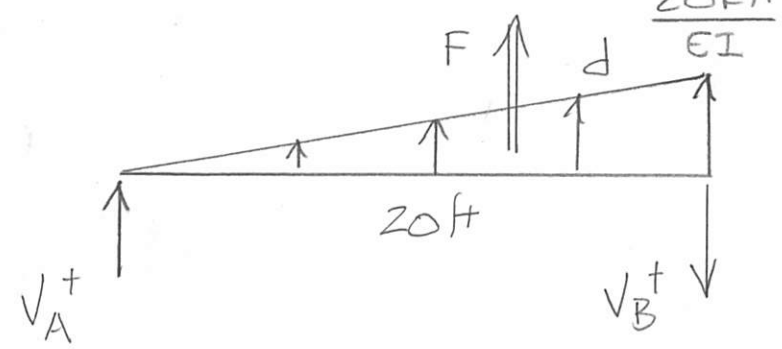
$$\circlearrowleft^+ \sum M_B = 0 = 20\,k\text{ft} - V_A(20\,\text{ft})$$

$$V_A = 1\,k$$

$$+\uparrow \sum F_y = 0 = V_A - V_B$$

$$V_B = 1\,K$$

CONJUGATE BEAM

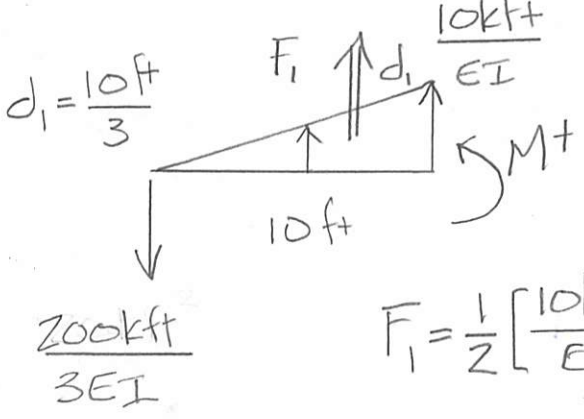


$$\circlearrowleft^+ \sum M_B = 0 = -Fd - V_A(20\,\text{ft})$$

$$V_A = -\frac{200\,k\text{ft}^2}{3EI}$$

$$F = \frac{1}{2}\left[\frac{20\,k\text{ft}}{EI}\right]20\,\text{ft} = \frac{200\,k\text{ft}^2}{EI}$$

$$d = \frac{1}{3}(20\,\text{ft})$$



$$\circlearrowleft^+ \sum M_{cut} = 0 = -F_1 d_1 + M + \frac{200\,k\text{ft}}{3EI}(10\,\text{ft})$$

$$M = -\frac{500\,k\text{ft}^3}{EI}$$

$$F_1 = \frac{1}{2}\left[\frac{10\,k\text{ft}}{EI}\right]10\,\text{ft}$$