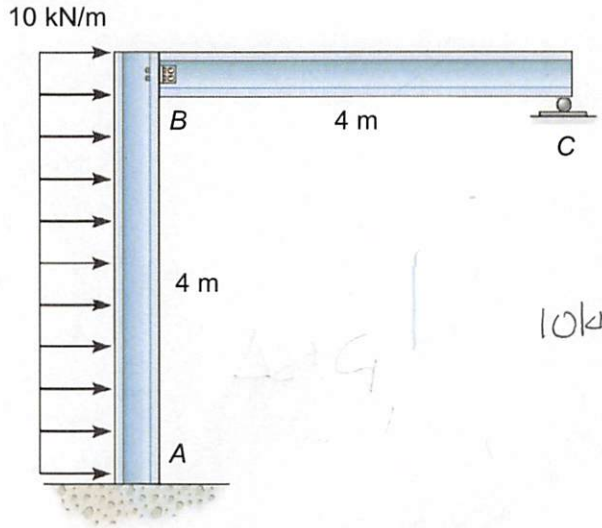
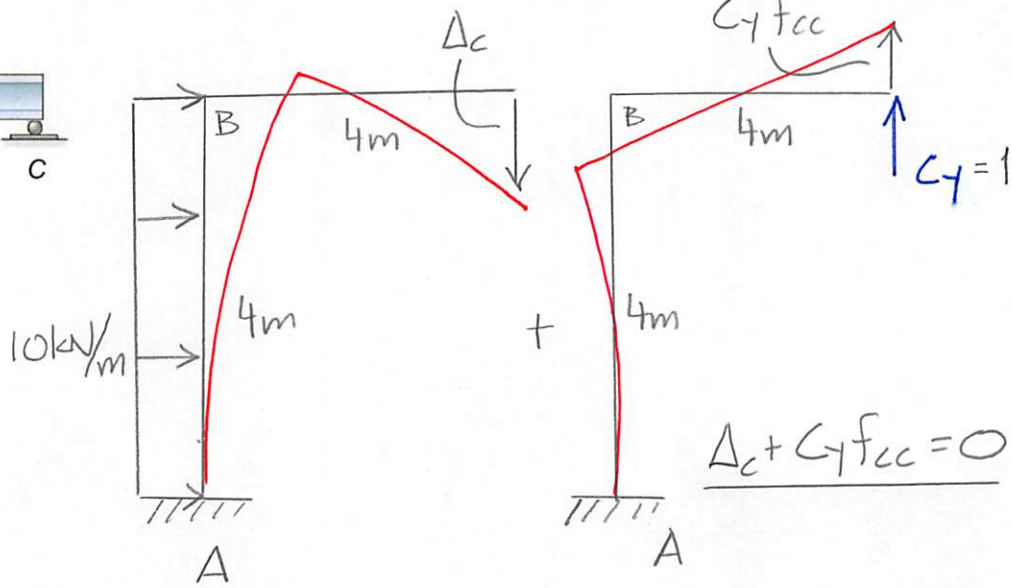
CIVL 4122 Quiz #2 F25 Name: _____

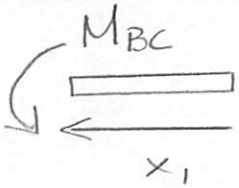
Determine the reaction at the roller support *C*. Support *A* is a fixed connection.





VIRTUAL WORK – [REAL MOMENTS

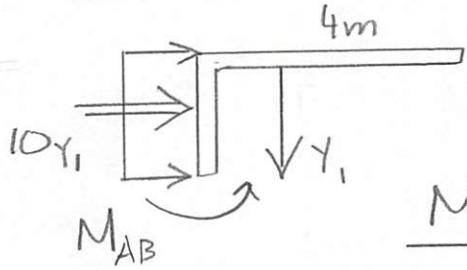
SECTION BC



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

$= M_{BC} = 0$

SECTION BA



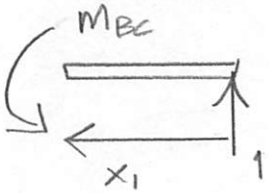
$\circlearrowleft + \sum M_{CUT} = 0$

$= M_{AB} - 10Y_1(Y_1/2)$

$M_{AB} = [5Y_1^2]\ kN\,m$

[VIRTUAL MOMENTS

SECTION BC

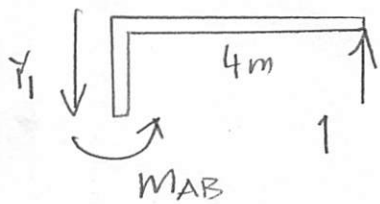


$\circlearrowleft + \sum M_{CUT} = 0$

$= m_{BC} + 1\,x_1$

$m_{BC} = [-x_1]\ m$

SECTION BA



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

$= m_{AB} + 1(4m)$

$M_{AB} = -4\ m$

$$EI\Delta_C = \int_0^4 M_{BC}\, m_{BC}\, dx_1 + \int_0^4 M_{AB} m_{AB}\, dY_1 = \int_0^4 (5Y_1^2)(-4)\, dY_1 = -\frac{20Y_1^3}{3}\Big|_0^4$$

$$= -\frac{1{,}280\ kN\,m^3}{3}$$

$$EI f_{cc} = \int_0^4 m_{BC}^2 \, dx_1 + \int_0^4 m_{AB}^2 \, dy_1 = \int_0^4 (-x_1)^2 dx_1 + \int_0^4 (-4)^2 dy_1$$

$$= \frac{x_1^3}{3}\Big|_0^4 + 16 y_1 \Big|_0^4 = \frac{64}{3} + 64 = \frac{256\,m^3}{3}$$

$$\Delta_c + C_4 f_{cc} = 0 = -\frac{1{,}280\,kN\,m^3}{3EI} + C_4\left(\frac{256\,m^3}{3EI}\right)$$

$$C_4 = \frac{1{,}280\,kN\,m^3}{256\,m^3} = \underline{\underline{5\,kN}}$$