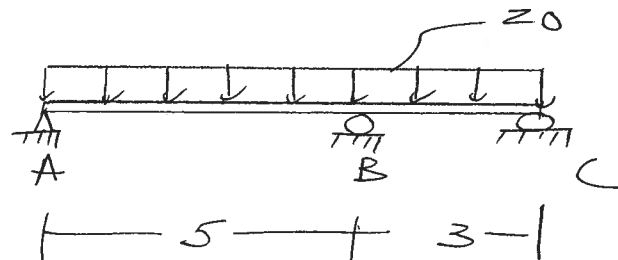
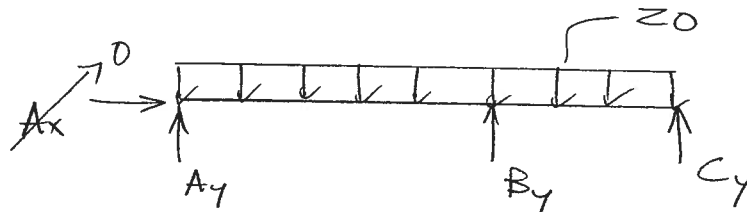


Use the method of superposition to calculate the reactions for the beam loaded as shown. Assume EI is constant.



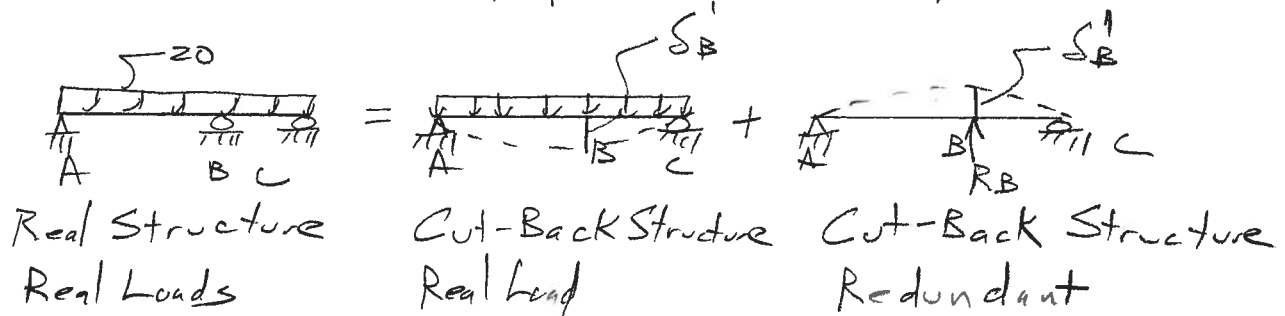
First sketch a F.B.D. of the beam.



This problem is indeterminate to the 1st degree.

Select B_y as redundant

Next we show superposition decomposition



Using Case (1) from deflection tables.

$$(1) \quad v = - \frac{qx}{24EI} (L^3 - 2Lx^2 + x^3)$$

$$(2) \quad \delta'_B = - \frac{20(5)}{24EI} (8^3 - 2(8)(5)^2 + (5)^3)$$

$$(3) \quad \delta'_B = - \frac{987.5}{EI}$$

Using Case (5) from deflection tables

$$(4) \quad v = - \frac{Pbx}{6LEI} (L^2 - b^2 - x^2) \quad 0 \leq x \leq a$$

$$(5) \quad \delta''_B = - \frac{-B_y(3)(5)}{6(8)EI} (8^2 - 3^2 - 5^2)$$

$$(6) \quad \delta''_B = + \frac{9.375 B_y}{EI}$$

We know that the deflection at point B on the real beam with real loads is equal to zero. So:

$$(7) \quad \delta_B = 0 = \delta'_B + \delta''_B$$

$$(8) \quad 0 = - \frac{987.5}{EI} + \frac{9.375 B_y}{EI}$$

$$(9) \quad \underline{B_y = 105.3} \quad \uparrow \quad \text{as shown}$$

