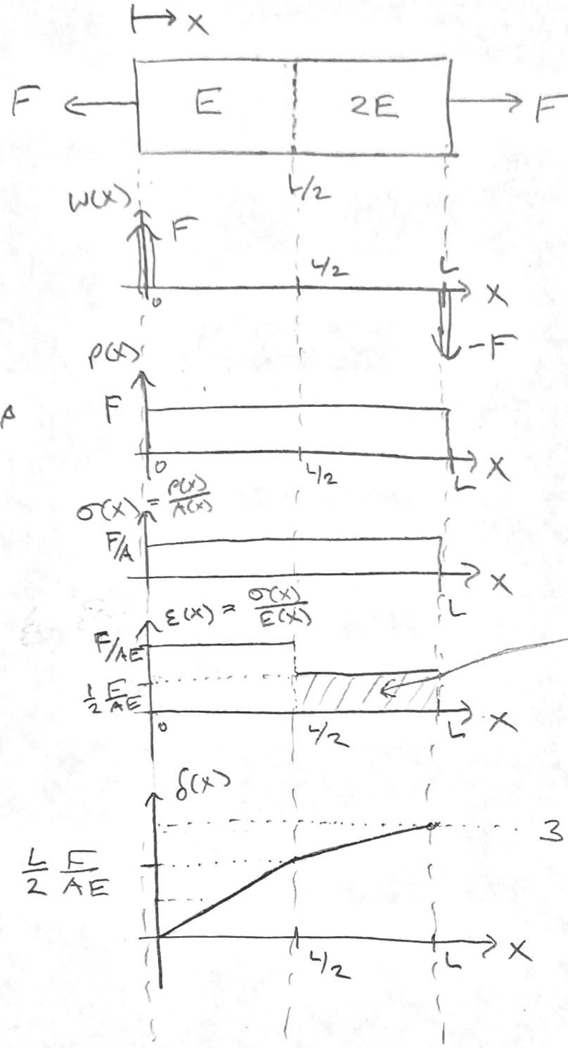
1/28/2016
MMED 3400



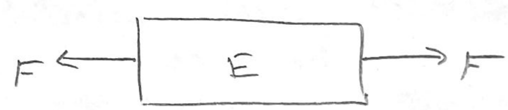
$$E(x) = \begin{cases} E & 0 \le x \le L/2 \\ 2E & L/2 < x \le L \end{cases}$$

$$p(x) = \int_{-\epsilon}^{x} w(s)\,ds$$

$\frac{1}{2}\frac{F}{AE} \cdot \frac{L}{2}$ = area of this rectangle

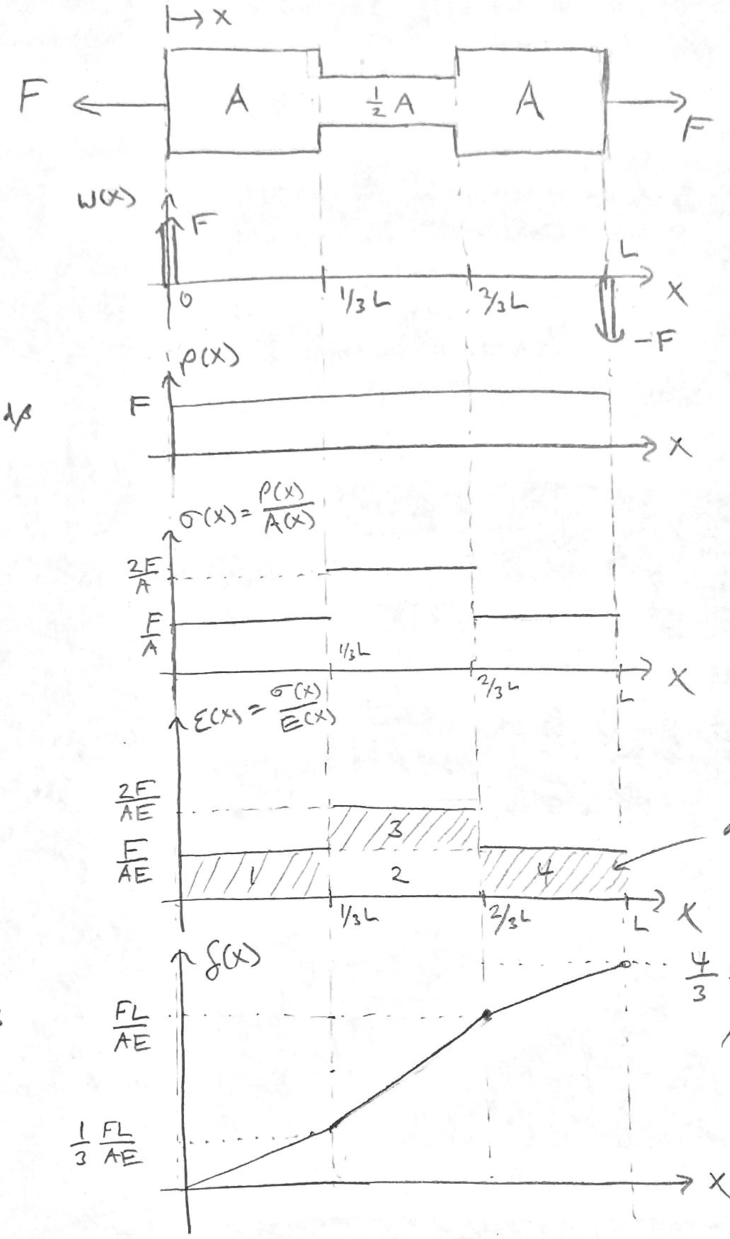
$$\delta(x) = \int_{-\epsilon}^{x} \varepsilon(s)\,ds$$

$$3\left(\frac{1}{2}\frac{F}{AE}\cdot\frac{L}{2}\right) = \frac{3}{4}\frac{FL}{AE} = \delta(x=L) = \delta_{tot}$$



$$\delta_{tot} = \frac{FL}{AE}$$

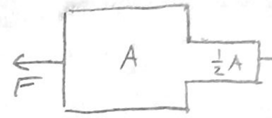
3/4 the change
in length due
to stiffer material



$$A(x) = \begin{cases} A & 0 \le x \le \frac{1}{3}L \\ \frac{1}{2}A & \frac{1}{3}L < x < \frac{2}{3}L \\ A & \frac{2}{3}L \le x \le L \end{cases}$$

$$E(x) = E$$

$$\rho(x) = \int_{-\epsilon}^{x} w(\beta)\, d\beta$$

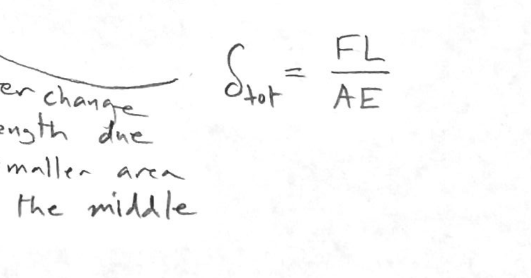


$\rho(x = L/2) = F$

area of each of these 4 boxes is $\frac{1}{3}\frac{FL}{AE}$

$$\delta(x) = \int_{-\epsilon}^{x} \varepsilon(\beta)\, d\beta$$

$$\frac{4}{3}\frac{FL}{AE} = \delta(x=L) = \delta_{tot}$$



$$\delta_{tot} = \frac{FL}{AE}$$

greater change in length due to smaller area of the middle