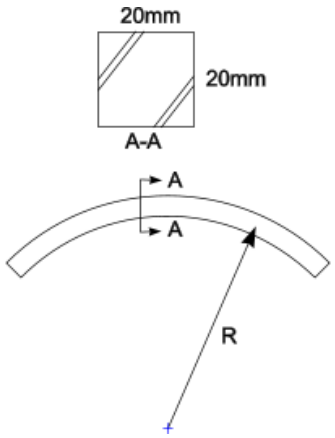
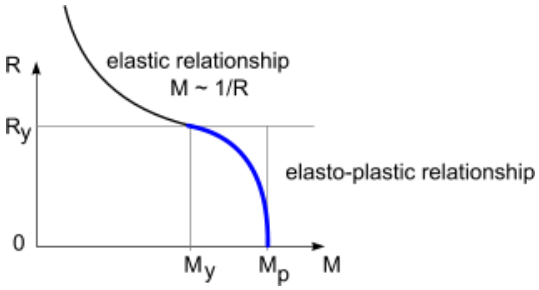
Review #2 6003 – Ship Structures II Nov 28, 2014

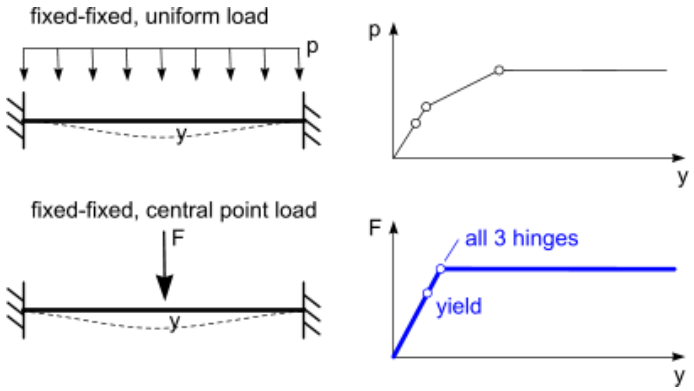
1) Consider a square steel bar. $\sigma_y = 400\ MPa, E = 200\ GPa$
What is the minimum radius R that the bar can be bent to and remain elastic?
5 m
If you bend further so that the radius is R/2, what is the moment in the bar?
0.733 kN-m



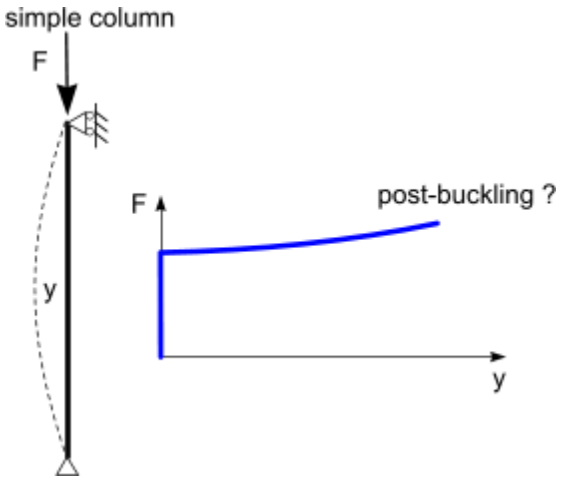
2) For the above case. What is the shape of the R vs M curve after yield ?



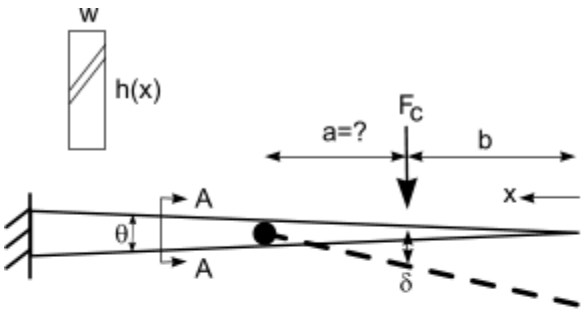
3) For a fixed-fixed long plate the load deflection curve is sketched. What would the curve look like for a central point load?



4) Experiment: Draw the F-d curve for a column (based on in class experiment.)



5) Find the location of a plastic hinge in a tapered cantilever beam, for a point load applied at distance 'b' from the end. The width of the beam is constant and the height varies.



EW = IW

$$Fc = \frac{w}{4}\sigma_y \theta^2 \frac{(a+b)^2}{a}$$

$\frac{w}{4}\sigma_y \theta^2$ is constant

Fc is minimum when $\frac{(a+b)^2}{a}$ is minimum

using derivative = 0 will show that min occurs at: a =b