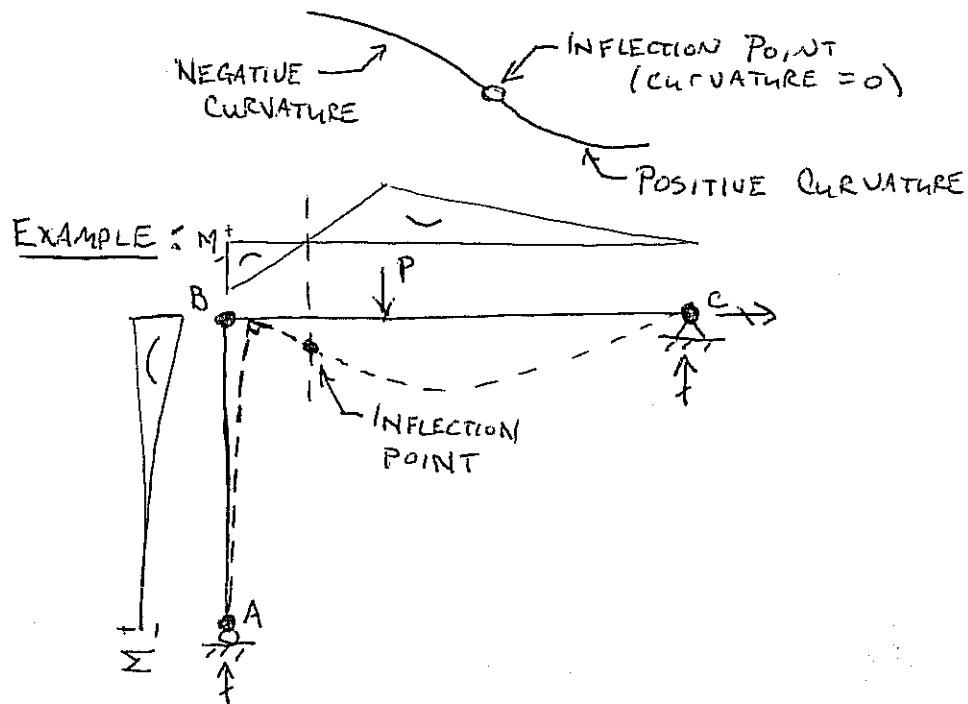


- SKETCHING DEFLECTED SHAPES: INFLECTION POINTS

AT POINTS WHERE THE MOMENT CURVE IS ZERO, THERE EXISTS A POINT AT WHICH DIRECTION OF CURVATURE CHANGES: INFLECTION POINT

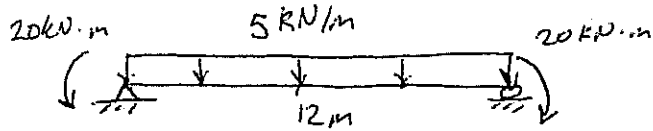


LESSON 9:

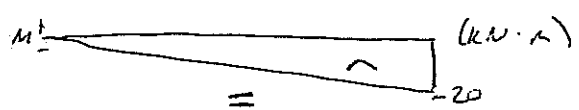
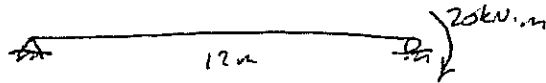
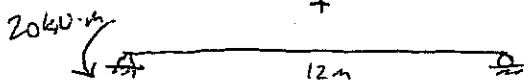
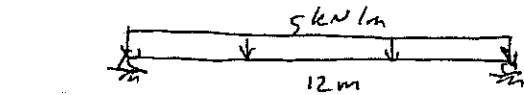
PRINCIPLE OF SUPERPOSITION:

FOR STRUCTURES THAT BEHAVE IN A LINEAR-ELASTIC FASHION, FORCES & DISPLACEMENTS DUE TO A SET OF LOADS ARE EQUAL TO THE SUM OF THE FORCES AND DISPLACEMENTS DUE TO EACH LOAD INDIVIDUALLY.

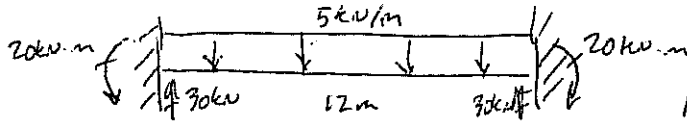
SUPERPOSITION ILLUSTRATION



EQUIVALENT TO;



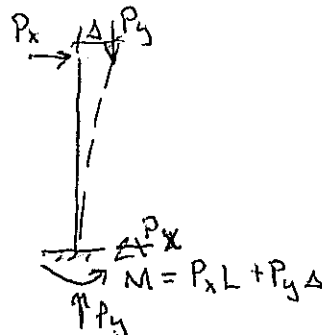
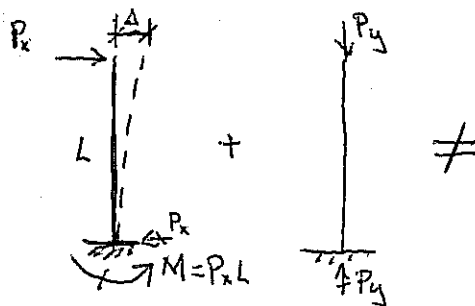
USEFUL? THINK ABOUT THIS BEAM



LIMITATIONS ON SUPERPOSITION:

- LINEAR SYSTEMS ONLY:

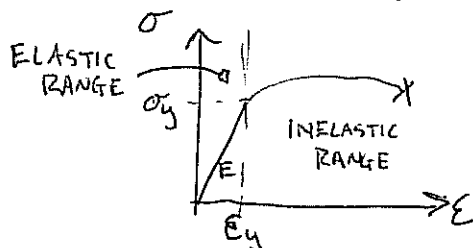
NOT LINEAR IF DEFLECTIONS ARE LARGE



if Δ is "large"
GEOMETRIC NON-LINEARITY

- ELASTIC SYSTEMS ONLY

NOT ELASTIC IF YIELD STRAIN (STRESS) HAS BEEN EXCEEDED.

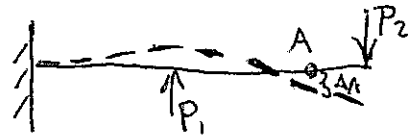


MATERIAL NON-LINEARITY

Beams: $\sigma_b > \sigma_y \rightarrow$ Inelastic! No Superposition.

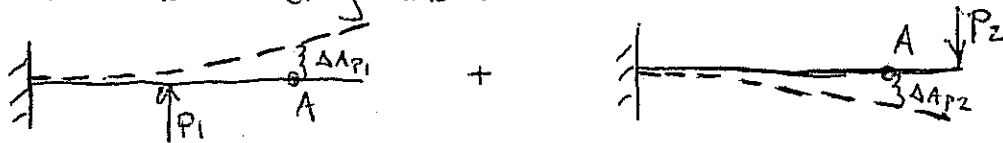
SUPERPOSITION AND DEFLECTION :

- Deflected shape due to 2 loads ;



ARBITRARY POINT, A

- Can be found by adding deflected shape from each load acting alone.

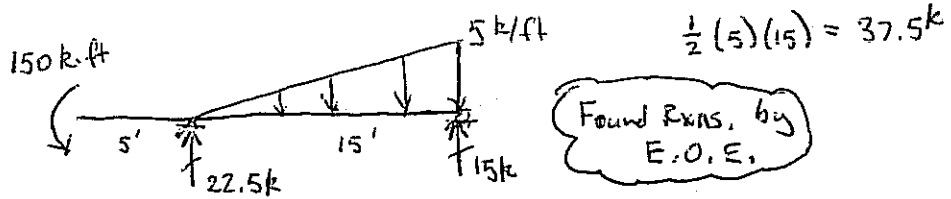


$$\Delta_A = \Delta_{AP1} + \Delta_{AP2}$$

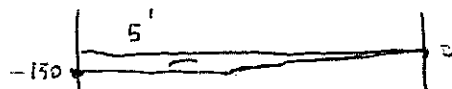
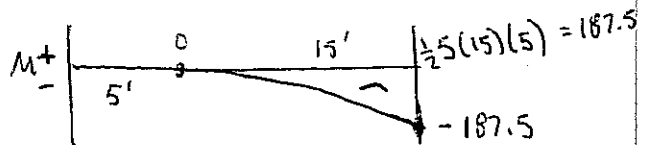
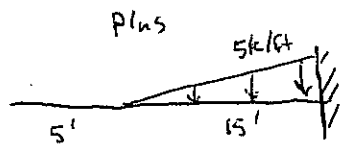
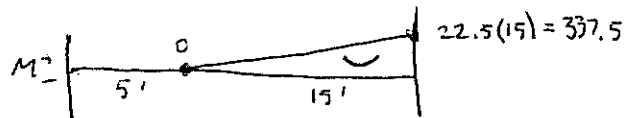
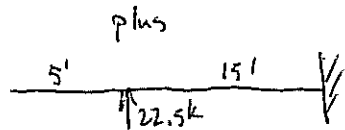
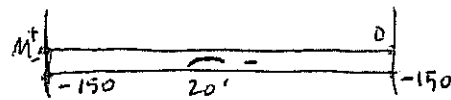
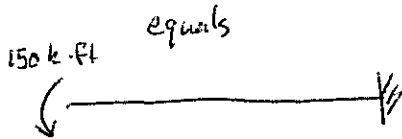
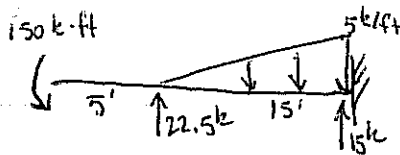
MORE

DIRECT COMPUTATION OF MOMENT DIAGRAM W/ SUPERPOSITION

EXAMPLE



Replace supports with fixed-end at right - but keep reaction forces.



END MOMENT = -150 + 337.5 - 187.5

= 0
Why did this work?