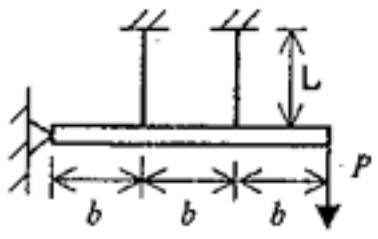
(25%) 1. A structure, which consists of a *rigid* horizontal bar supported by two identical vertical wires, is pin-supported at one end and loaded at the other end as shown below. Each of the wires has the axial rigidity EA and is made of an elastic-perfectly plastic material of yield stress σ_y.



(a) Explain if the structure is statically determinate or indeterminate.

(b) Write down the equilibrium and the compatibility equations for the system.

(c) Find the *yield* load P_y and the *ultimate* load P_u of the system.

(d) Construct the load-displacement diagram relating the load P to the end displacement.

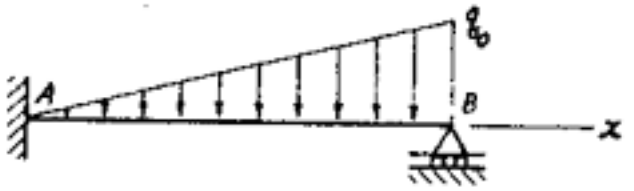
(25%) 2. A thin-walled semicircular cross section is shown below, where t is the thickness of the section and r is the radius of the centerline.

(a) Find the shear flow distribution when the section is subject to a vertical shear force V_y through the shear center.

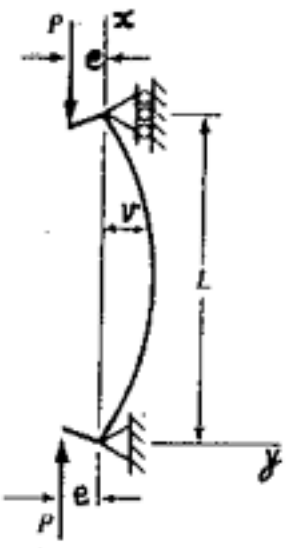
(b) Locate the shear center of the section.

(c) Why are we interested in finding the shear center?

(25%) 3. Obtain the equation of the deflection curve and all the reactions for a propped cantilever beam AB supporting a triangular load of maximum intensity q_0.



(25%) 4. The load P is applied to the column with a small eccentricity e from the axis of the column as shown.



(a) Find the maximum deflection of the column.

(b) Can we use the principle of superposition for calculating deflections due to more than one load? Why?