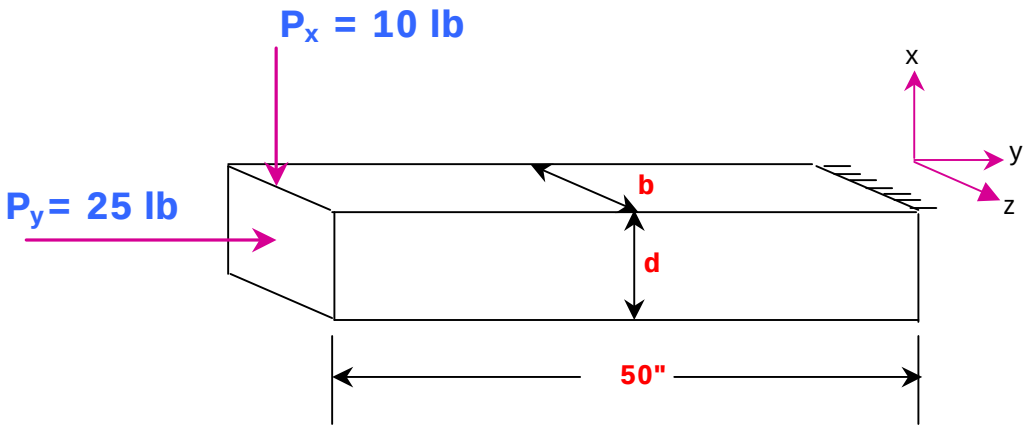
Problem Session 1

A beam-column of rectangular cross section is required to carry an axial load of 25 lb and a transverse load of 10 lb, as shown. The beam is to be designed to avoid the possibility of yielding and buckling and for minimum weight. Formulate the optimization problem by assuming that beam-column can bend only in the xy plane. The material should be steel with specific weight of 0.3 lb/in^3, Young's Modulus of Elasticity, E, of 30 E6 psi, and yield strength, S_y, of 30 E3 psi. The width of the beam is required to be at least 1/2 in. and not greater than twice the depth.



The axial buckling load is given by the following formula:

$$P_{y\,critical} = \frac{p^2 E I_{zz}}{4L^2}$$

List all design **variables**:

List all **constraints** :

Write out the **objective function:**

What **answers** did Solver produce?

b =
L =
d =

Minimized weight =