

ME 3710 – Spring 2024

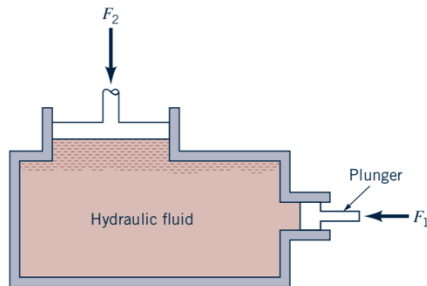
Homework 3

Due February 1 at 11:59pm – upload to files to Gradescope

18 points

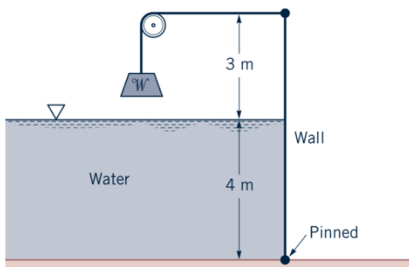
Problem 2.68

The basic elements of a hydraulic press are shown in the figure below. The plunger has an area of 1 in.^2 , and a force, F_1 , can be applied to the plunger through a lever mechanism having a mechanical advantage of 8 to 1. If the large piston has an area of 150 in.^2 , what load, F_2 , can be raised by a force of 30 lb applied to the lever? Neglect the hydrostatic pressure variation.



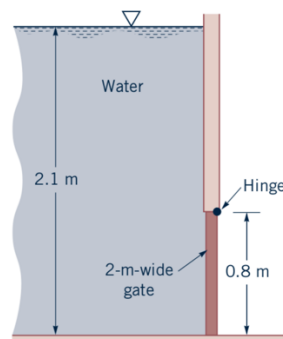
Problem 2.76

Find the weight W needed to hold the wall shown in the figure below upright. The wall is 10 m wide.



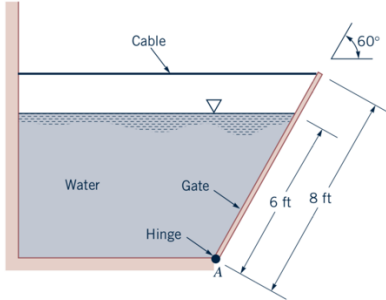
Problem 2.77

Determine the magnitude and direction of the force that must be applied to the bottom of the gate shown in the figure below to keep the gate closed.

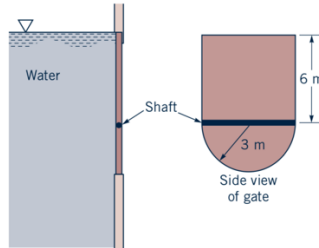


Problem 2.87

A homogeneous, 4-ft-wide, 8-ft-long rectangular gate weighing 800 lb is held in place by a horizontal flexible cable as shown in the figure below. Water acts against the gate, which is hinged at point A . Friction in the hinge is negligible. Determine the tension in the cable.

**Problem 2.88**

A gate having the shape shown in the figure below is located in the vertical side of an open tank containing water. The gate is mounted on a horizontal shaft. (a) When the water level is at the top of the gate, determine the magnitude of the fluid force on the rectangular portion of the gate above the shaft and the magnitude of the fluid force on the semicircular portion of the gate below the shaft. (b) For this same fluid depth determine the moment of the force acting on the semicircular portion of the gate with respect to an axis that coincides with the shaft.

**Problem 2.104**

The massless, 4-ft-wide gate shown in the figure below pivots about the frictionless hinge O . It is held in place by the 2000 lb counterweight, W . Determine the water depth, h .

