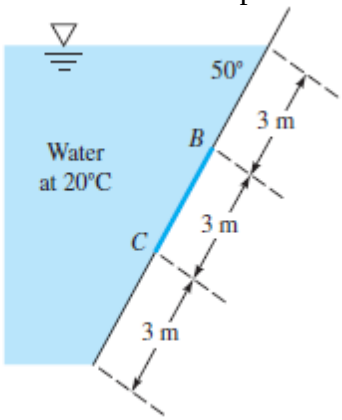
September 28, 2023

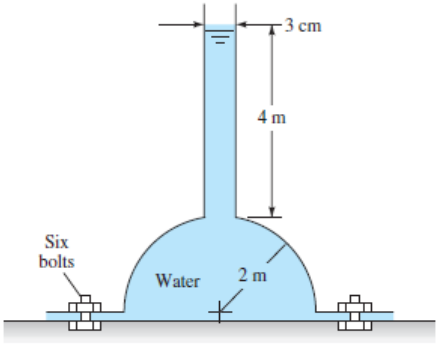
Mechanical, Automotive and Materials Engineering
Fluid Mechanics I
MECH3233-F23
Assignment Problems Set #3

Due: Thursday, October 5, 2023, at 11:59 p.m.

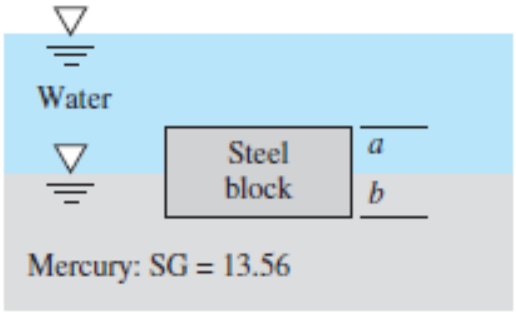
Problem 1 (4 points): If panel BC shown in the figure below is circular. Compute (a) the hydrostatic force of the water on the panel, (b) its center of pressure measured from the free surface along the length of the gate, and (c) the moment of this force about point B.



Problem 2(4 points): The hemispherical dome shown in figure below weighs 30 kN and is filled with water and attached to the floor by six equally spaced bolts. What is the force in each bolt required to hold down the dome?



Problem 3 (3 points): A uniform block of steel (SG = 7.85) will "float" at a mercury–water interface as in figure below. What is the ratio of the distances *a* and *b* for this condition?



Problem 4(5 points): Pressurized water fills the tank shown in the figure below. Compute the net hydrostatic force on the **conical surface *ABC***.