

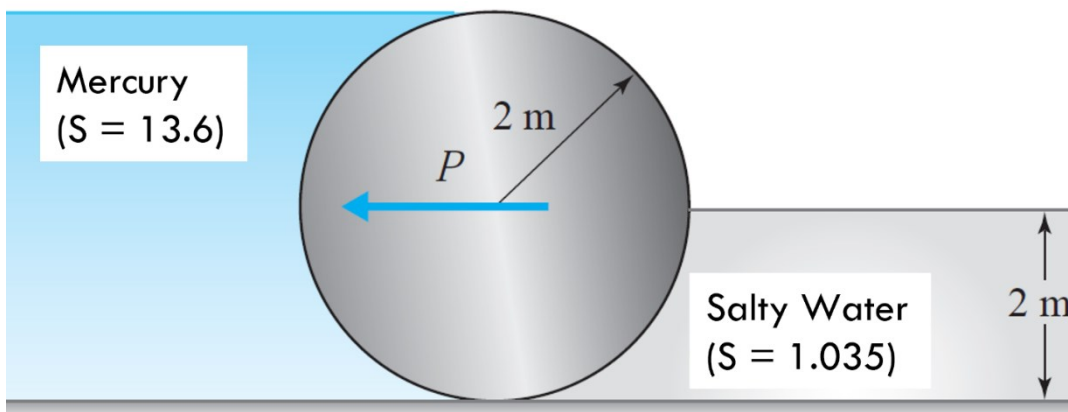
**Florida International University**  
**CWR 3201 Fluid Mechanics, Fall 2022**  
**Mid-term # 1**

**Instructor:** Arturo S. Leon, Ph.D., P.E., D.WRE

**Student Name:** \_\_\_\_\_ **Panther ID:** \_\_\_\_\_

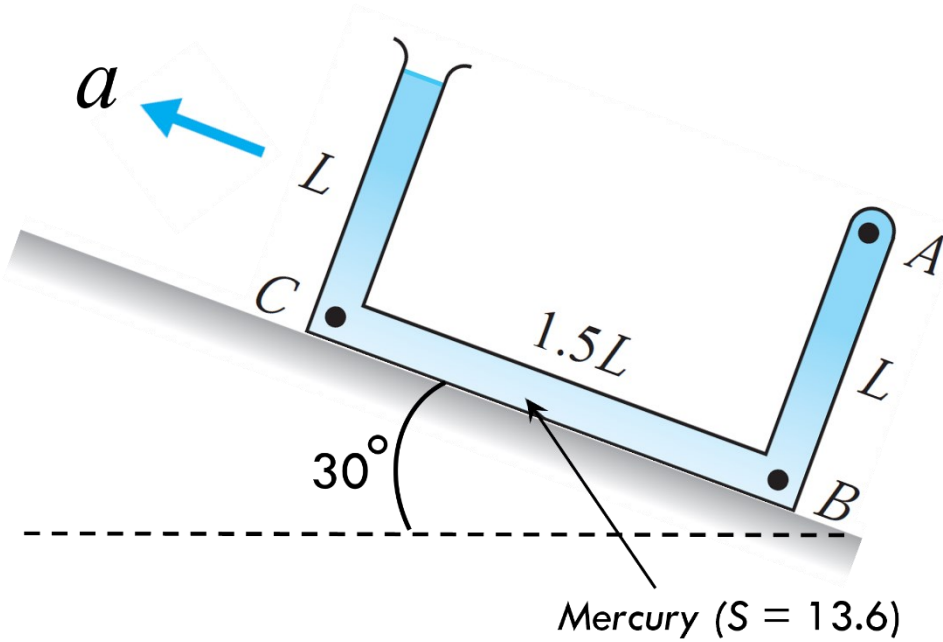
✓ You will have 1 h 15 minutes to complete the exam. The exam is closed book and closed notes.  
Only one page (front and back) with handwritten equations are allowed

1. **(30 points)**. Find the force “ $P$ ” needed to hold the 5-m-long cylinder in position as shown in the figure below.





2. (30 points) The U-tube shown in the figure below is filled with mercury and accelerated. Find the pressure at point  $B$  if the acceleration  $a = 20 \text{ m/s}^2$  and  $L = 1 \text{ m}$ .





3. **(40 points)** A 30-m-long vessel, with a cross-section shown in the figure below, carries a load of 6000 kN.
- (a) **(20 points)** Find the distance (**D**) from the top of the vessel to the liquid top level if the vessel mass is 120000 kg and the liquid has a specific gravity (*S*) of 1.4.
- (b) **(20 points)** Is the vessel stable? The center of gravity (**G**) of the combined vessel and load is located as shown below.

