Reflection Test 2- Fluid Mechanics

1) Test two demonstrated course objective number 1, number 4, and 8. For objective 1, understanding the fundamental nature of fluids and defining fluid properties like viscosity and pressure. This was needed to use tables and equations surrounding pressure and dynamic viscosity for question one. Objective 4, applying Bernoulli's formula to mass and various fluid flow systems was applied to the first question to determine the loss due to friction and the pump, and used to find the pressure at the inlet and outlet of the pump. Lastly, objective 8, calculating using different instruments to measure flow rate, quantities, pressure, etc. This was applied to the second part of the test, using a flow nozzle to determine the pressure drop to the pipe diameter ratio.

2) For the first part of the test, I got all my calculations and numbers correct, the only thing that is different is that I converted all my units to metric and not English units, but this should not make a difference in application. Although, I did use the wrong equation for the pressure at the pump inlet and outlet.

For the second part, I used the velocity equation for instruments instead of the flow rate one. This only varied the problem slightly. I used the same C equation and I got my values in kPa. My percentage is a lot smaller than the solution, but that is due to using the wrong formula to find hL additional which made my HP larger than what it should have been.

For the third part, I got the correct area and wetted perimeter for the lower channel and plugged it into the Q equation using slope, hydraulic radius, and area. I used 1/n, but it was supposed to be 1.49/n. This changed my final answer because my Q value was lower than it should have been. My percent was still under 5% so it could be considered negligible.

3)

1.	Purpose	0.5/10.0
2.	Drawings	1.0/10.0
3.	Sources	1.0/10.0
4.	Design considerations	1.0/10.0
5.	Data and variables	0.5/10.0
6.	Procedure	2.0/10.0

7. Calculations	2.0/10.0
8. Summary	0.5/10.0
9. Materials	0.5/10.0
10. Analysis	1.0/10.0
TOTAL	10.0/10.0

PART 1)

1. Select pipe diameter	1/8
2. Use Bernoulli's to get ha (ref & points in pict.)	1/8
3. Pipe energy losses	1/8
4. Pump power with efficiency	1/8
5. Calculate inlet and outlet pressures	0/8
6. Proper excel spreadsheet	1/8
7. Plot pump power vs. pipe diameter and inlet & outlet pump pressures vs. pipe diameter	1/8
8. Correct results?	0/8
	6/8

PART 2)

1. Solve for dP with right equation and A1/A2	0.5/6
2. C value	1/6
3. Additional pump power	0.5/6
4. Proper excel spreadsheet	1/6
5. plot pressure drop across the nozzle vs. nozzle diameter to pipe diameter ratio.	1/6
6. Correct results?	0/6
	4/6

PART 3)

1. Correct equation	1/7
2. Area calculation	1/7
3. Hydraulic radius calculation	1/7
4. % of pumped water flow	0.5/7

5.	Proper excel spreadsheet	1/7
6.	plot % of pumped water flow vs. water elev	1/7
7.	Correct results?	0.5/7
		6 /7

FINAL GRADE:

10.0 + (80/3)*(6/8 + 4/6 + 6/7) = 70.63%

4) a.

While completing the test, I ran into a couple issues like where to put my reference points, identifying values in Bernoulli's, and which tables to use for values. I asked the professor to point me in the right direction, which helped me correct myself. I also reached out to my classmates to ask which tables were used for dynamic viscosity and roughness.

b.

I started on Monday before class and when I ran into questions, I kept them and brought them to class that afternoon. Then I spent the rest of the day completing my first question and excel sheet. Tuesday I went into the second question and had to ask about my flow nozzle diagram and equation. I then double checked and corrected my first question and excel and worked on the second excel. Wednesday, I did the third question and excel sheet and finished my write up and submitted. I would not change anything about my process since I got to ask all my questions and finish the test before the due date.

c.

I have learned more about the applications of Bernuolli's equation and how many different variables relate to one another. I also learned more about the principles of a flow nozzle and the relationship between pipe diameter and pressure drop.

d.

In a mechanical engineering career, we will encounter systems involving fluids, pumps, natural channels, and elevation differences, where we'll need to apply the concepts we're learning now.

e.

In my first professional engineering career, I will be using all these concepts to apply to real-world situations to fix, design, or maintain fluid systems.

f.

Yes, for my first professional career these concepts and skills I am learning in this course will be very useful.

g.

If asked at my future job to design a pump system to move water up a building to the 10th floor, I will be able to apply the concepts of fluid flow that I learned in this course to complete that task.

h.

The only course I have used this information for is the lab for fluid mechanics. This is helpful because it reinforces the material and concepts that were presented in lecture.

i.

I think I was most successful when I completely understood what I was looking for and how to obtain that through the equations. Also, my time management was great for this test, which improved from test 1.

j.

Whenever working in the industry with fluids moving or stagnant, I will be able to apply material we learned in class to those applications.

k.

I spent about 3 whole days working on this test. I took many breaks in between and moved location multiple times to reset myself. My goal was to finish about $1\,1/3$ of a question so that I could sleep on a question and correct anything I was not sure about in the morning. I would not do much differently, because I have learned how to manage my time for these types of tests. This process worked for me and allowed me to take mental breaks, get full nights of sleep, and on-time completion for all parts of this test.