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MET330: Fluid Mechanics

Test Reflection 1

1. How and why does this test demonstrate your work toward one, or more, of the course learning objectives?

- a.** In order to succeed on this test, I had to:
 - i.** Compute friction losses in pipes for a variety of configurations (series, parallel, network, etc.)
 - ii.** Apply the principles of conservation of energy (Bernoulli's equation) and mass to fluid flow systems
 - iii.** Describe the nature of fluids and define different fluid properties such as viscosity and pressure

The way I demonstrated my work was by utilizing Bernoulli's equation as well as Darcy's equation for losses in elbows and pipes. Pressure and viscosity were a necessary part of this calculation as the state of a fluid's flow is very, very dependent on these values and thus you must understand them to know that.

2. How your test compares against the available solution. State the mistakes you made and what you will do next time to avoid making same mistakes. Please point out exactly where you made the mistake, say why you made the mistake, and how you should have done it. If you were taking this test again, what advice would you give yourself to ensure that you had a successful test?

- a. My test follows relatively well to the posted solution, except the numbers are different because of a unit conversion error mentioned later. One mistake I made was not handling units as well as I could, specifically in the final solution. The reason I made this mistake is because I was not being careful with my units and was thinking more about the actual problem. Other than that, it was not difficult to take the test. If I were to take it again, I would make *sure* that I handled the units correctly.

3. What should your grade be? Base it on the writing rubric provided in the test and the correctness of your solution. What are the strengths and weaknesses of your test?

- a. After grading myself on the rubric, my grade should be about a 73. The main weakness of my test was the final solution, which was in units of $\frac{lb}{ft^2}$ instead of $\frac{lb}{in^2}$, throwing off the calculation of the other questions which depended on the answer to the first question. Units were a problem for me during this test, and I will attempt to improve on them for future ones.

4. **Discuss the following:**

a. What issues did you encounter in completing the test? How did you troubleshoot them?

- i. The only issue I had when completing the test was in the unit conversions. The way I overcame them (at least partially) was to meticulously write them down after completing them on another sheet.

b. What steps did you take to complete the whole test? Would you change something?

c. What new concepts have you learned?

- i. I have learned how to compute the flow rate of a pipe, the way to calculate a manometer reading, how to use Bernoulli's equation to relate and solve for fluid pressure, velocity, specific weight and losses, used Darcy's equation as applied to the system in order to calculate losses and arrive at a pressure, and brushed up on my Excel skills to create a good spreadsheet.

d. Where do you think engineers use those concepts (provide specific examples)?

- i. Engineers use fluid mechanics concepts to design pumps, pipe systems, nozzles, drains, pipelines, essentially the entire field of fluid mechanics is based from these core concepts.

e. Where do you think you will be using everything you learned?

- i. I will use them in my career when I get into more advanced fluid projects or learning. I will also use them to facilitate future coursework in this field, which is my field of interest.

f. Do you think what you learn is important for your professional career?

- i. It will be extremely important because my professional career will (hopefully) be in computational fluid dynamics and fluid mechanics, so I will have to have a great grasp of these concepts.

g. How, when, where and why you might use this information or skill in the future?

- i. I will almost certainly use this information in my career as a mechanical engineer in the design or development of a system where I may need to consider multiple fluid mechanics related factors, such as design of a water cooling system or a transfer system for fluids.

h. h. Have you been able to apply concepts you have learned in the course to what you do at work or in other courses?

- i. There is a tiny overlap between this course and thermos applications, but outside of that I haven't been able to apply it.

i. What areas did you feel you were most successful, or improved the most?

- i. I was most successful at utilizing the Bernoulli equation with losses, finding the friction factor and Reynold's number and solving for the manometer.

j. How do you see this course's content intersecting with your field or career?

- i. As mentioned above, my field of interest is fluids and fluid mechanics, specifically computational fluid dynamics. This means that this course's content is fundamental to my career as an engineer when I get into that field.

k. How much time did you spend on the test? How was the time organized?

- i. I spent about 4-5 hours on it, not on one problem and spread out over the time of the test. Roughly an hour a day. The time was mostly spent formatting, thinking about the states of the fluids, and preparing the Excel spreadsheet.

l. What would you do differently? Why?

- i. I would work even more carefully with units to ensure that my final answer is in psig instead of pounds per square foot gauge (144x difference). Other than that I would prepare the Excel spreadsheet better, I felt as if it could use a bit of polishing.