

Test 2 Reflection

1. How and why the test demonstrates your work toward one, or more, of the course learning objectives. Be specific on the course objectives you decide to mention.
 - a. Test 2 for the MET330 class at Old Dominion University demonstrates work towards 4 of the 9 class objectives. These objectives are: 1. Explain the fluid dynamics in pipes and fittings. 2. Apply the principles of conservation of energy (Bernoulli's equation) and mass to fluid flow systems. 3. Compute friction losses in pipes for a variety of configurations (series, parallel, network, etc.). 4. Identify and solve for different very specific industrial problems, such as, open-channel flow, cavitation, water hammer, drag, lift, forces in pipes, and learn about different instruments to measure fluid flow quantities (such as, pressure, fluid velocity, flow velocity, etc.); Problem 1 of the test goes through the first three objectives as we had to use resistance values with the tee, elbows, pipe, and valves as well as use Bernoulli's equation to dictate Q so we could start the iteration process. Problem 2 of the test goes through the first three objectives as well and the fourth objective because we use annular flow for this problem.
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. Problem 1:
 - i. I computed the friction value at 0.024. Solutions has friction value at 0.024946 which cause some variation in values; however, my solution and the test solution were set up the same way. The test question asks for the pressure at the exit of the tee, but the test solution doesn't have anything towards this so can't say if anything is wrong there.
 - b. Problem 2:
 - i. I used a different Z value in the formula to compute velocity. I used 2.8m instead of 1m since I thought we were to use the entire L value and not the "difference". For future tests, I would ensure that my reference points are set up correctly and reread the question to verify what it's asking for. Another variance was the friction value I had (0.019) versus test solution friction value (0.0168). I also only used

two elbows instead of four elbows. Silly mistake there. Due to my varied velocity value, the other values will be different than the test solution as well, such as Q and D. I did however, still end up with the same choice of steel pipe (125mm OD).

3. What your grade should 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. Problem 1:

- i. Correct application of 2 Bernoulli's + Conservation of mass? 3/12
 - 1. 3/12
- ii. Were all minor losses handled? 2/12
 - 1. 2/12
- iii. Have the equations worked out with numbers? 1/12
 - 1. 1/12
- iv. Was there an iterative procedure to solve system of eqs? 3/12
 - 1. 1/12
- v. Was the velocity criterion checked? 1/12
 - 1. 1/12
- vi. Are the results correct? 2/12
 - 1. 2/12
 - a. Some variation in values but still within a +/- percentage of each other.

b. Problem 2:

- i. Correct application of 2 Bernoulli's + Conservation of mass? 3/12
 - 1. 3/12
- ii. Were all minor losses handled? 2/12
 - 1. 0/12
 - a. Got 6.975m versus 2.3575m
- iii. Have the equations worked out with numbers? 1/12
 - 1. 1/12
- iv. Was there an iterative procedure to solve system of eqs? 3/12
 - 1. 3/12
- v. Was the velocity criterion checked? 1/12
 - 1. 1/12
- vi. Are the results correct? 2/12
 - 1. 0/12

- a. Got 2.2kW electrical power versus test solution of 0.4442kW. This was due to the my $h(l)$ value being 3 times more than the test solution.
 - c. Total Grade = $(90/2) * (12/12 + 8/12) = 75$ test points + 9.2 HW points = 84.2 for Test 2
 - d. Strengths for Test 2 was setting up the formulas correctly and using the correct units. Weaknesses were getting hung up on simple things (forgetting resistance values for fittings), or not setting up reference points correctly.
4. Discuss the following:
- a. What issues did you encounter in completing the test? How did you troubleshoot them?
 - i. I didn't know some of the formulas needed for the annular flow or for pump power. Troubleshot by looking through textbook chapters for formulas. Also looked at the homework problem solutions to see if any similarities. Had some trouble setting up formulas in Excel for the iteration but was able to figure that out (a simple parenthesis issue).
 - b. What steps did you take to complete the whole test? Would you change something?
 - i. Broke it up into two nights of work (Problem 1 one night and problem 2 another night). I would not change this, I seem to work best this way. However, it was a little difficult with homework and lab report due in the same week as a holiday weekend but with summer semester, scheduling is a little funky.
 - c. What new concepts have you learned?
 - i. That algebra is used heavily! Using formulas that values equal and plugging those into the main Bernoulli's equation to find certain values we need. Also learning that simple things around the house we can use these formulas to best suit our application (i.e. gutters or plumbing lines for fountains).
 - d. Where you think engineers use those concepts (provide specific examples)?
 - i. More heavily used in plumbing for apartment complexes or gardens where water is heavily needed and used simultaneously.
 - e. Where do you think you will be using everything you learned?
 - i. I may use it on my own when doing a simple to-do project around the house, but I don't believe I'll use it at my career due to the fact we are in mechanical design and not dealing with fluids,
 - f. Do you think what you learn is important for your professional career?

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- i. As mentioned above, it may not be critically important, but it's still good to know that formulas can be used to compute certain values required.
- g. How, when, where and why you might use this information or skill in the future?
 - i. Would be beneficial when scoping out some plumbing lines for gardening, gutters for the house, or some decorative fountains.
- 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. No, not personally.
- i. What areas did you feel you were most successful, or improved the most?
 - i. Better at getting the formulas down and using those to figure the problem out.
- j. How do you see this course's content intersecting with your field or career?
 - i. More in tune with the foundational formulas.
- k. How much time did you spend on the test? How was the time organized? What would you do differently? Why?
 - i. Roughly 8 hours. 4 hours night 1 and 4 hours night 2.
 - ii. I would not do this differently as spending 8 hours in one day would be tough to do with a full time job, being a husband, and a father to two young boys.