Test 1 Reflection

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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.

Test 1 demonstrates my work toward several of the course learning objectives. The first one that can be seen is the application of the principles of conservation of energy including Bernoulli's equation in fluid systems. In both test problems, I was required to utilize Bernoulli's equation to solve for certain portions. For problem 1, I was given a change in pressure, height differences, and various manometric gage fluids that all had different specific weights. To solve the problem, I had to use all of the provided data and manipulate Bernoulli's equation. For problem 2, I had to use Bernoulli's equation as well. I had two tanks, one at each end of the piping system. I went from one tank to the other, filling in each of the variables that are in Bernoulli's and then solving for the energy added with energy loss considerations. Another course learning objective was to compute the pressure associated in a stagnant fluid. I had to do this in problem 1 of the test because the fluid in the manometer is not moving. I also had to compute series friction losses in a piping system for problem 2, which is another course learning objective.

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?

When comparing my test results to the provided solution I did several things correctly, however, there were several errors that I made which led to my answers being incorrect. For problem 1, I had the correct idea about how a manometer works – that the specific weight of the manometric fluid with directly affect the deflection in the manometer reading, even if the pressure difference is the same. The first mistake that I made was not completely writing out Bernoulli's equation for the manometer. Instead, I thought that I was able to simply use the Delta P=Y/h equation derived from Bernoulli's. By doing this, I didn't start from one end of the system and go to the other. This led me to leave out several

factors when solving for the manometer deflection with both gasoline and mercury as the gage fluid. What I should have done instead was begin at B and work my way to point A, plugging in my known values and solving for the deflection in the manometer, which would have included the pressure difference at A and B, the specific weight of the fluids involved, and the height of the manometer. I also plugged my calculations into excel, but my spreadsheet didn't look like the solution's due to not having as many variables as I should have because my initial set-up wasn't done properly.

While I did the majority of things correctly, I also did a few things incorrectly which led to slightly different results when compared to the provided test solution. The first thing that I noticed was that the solution was done with all units in metric, while I opted to do my calculations in imperial units. I recognized that to select a new pipe size, I would have to utilize the new required volume flow rate for the system. To do this, I started by converting to like units and then with the Q=VA equation, solving for the new required Flow Area with A=Q/V. I took the flow area required and found one in Appendix F of the textbook that was the closest. Alternatively, the test solution broke that down even further by using the equation for area and rearranging to solve for the diameter, then looking for the diameter in the Appendix F. My calculations led me to choose the same pipe size as in the solution. My calculations were very close to the answers on the test solutions for the Power Added and the Pump Head. Converting my 0.49 horsepower to kW for comparison, I had 0.36 kW of Power Added while the solution was 0.357 kW. This could be due to differences in rounding. For the pump head, I calculated 33.7722 ft which is about 10.3 m, and the solution's pump head was 10.4472 m. I believe this difference could also be due to rounding after looking at our procedures for solving and that they were almost identical. My pressure at the pump inlet was -17.17 kPa (converted from psig) as opposed to -12.64 kPa from the solution. I believe where I made the mistake here was setting up my equation properly when solving for the pressure. Next time I will pay closer attention to not include extra variables that aren't necessary. Another error that I made was not doing handwritten calculations for the pipe costs, 2-year operational costs, and total costs. When I read the question on the test, I interpreted it as simply using excel to perform these calculations. I did this; however, I didn't do it by hand as well like the posted solution shows. Next time I will be sure to do all work by hand as well as with excel. This will also help to double-check myself and catch any errors if I have any. Because my numbers were slightly different from the solution, my costs were different as well. All costs, while in the same ballpark as the solutions, are different. I tried to determine where I messed up here but couldn't pinpoint it because several variables are at play here and I wasn't able to open the solution as an excel file to see the formula differences.

However, I believe it can be attributed to rounding differences as well as not calculating my installation costs properly, which eventually led to variations from the correct answers.

If I was taking this test again, I would remember to always start with the entire Bernoulli's equation and cancel what you don't need. I would also remind myself that I should always pick a point at one end of the problem and work my way to the other end to ensure that I get all the required variables and that I don't leave anything out. Lastly, I will know that I am supposed to do both handwritten and excel calculations for the entire test to ensure that it will be like the posted solutions.

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?

Based on the rubric provided in the test and the correctness of my solution, I believe my grade should be a 72.6. The strengths of my test solution were the thoroughness of my explanations, the reputable source I used for my calculations and data variables, the drawings and diagrams that I made , and my thorough analysis of the problems. My weaknesses were the correctness of final answers and the setup of the first problem.

4) Discuss the following: a. What issues did you encounter in completing the test? How did you troubleshoot them? b. What steps did you take to complete the whole test? Would you change something? c. What new concepts have you learned? d. Where you think engineers use those concepts (provide specific examples)? e. Where do you think you will be using everything you learned? f. Do you think what you learn is important for your professional career? g. How, when, where and why you might use this information or skill in the future? 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. What areas did you feel you were most successful, or improved the most? j. How do you see this course's content intersecting with your field or career? k. How much time did you spend on the test? How was the time organized? What would you do differently? Why? In the reflection, you should describe the test using facts and feelings providing relevant details. You should identify strengths and weakness of the test and connect the test with experience. Finally, you should also clearly explain the quality of the artifact and give insight and state reason for judgment. You have the option of writing your reflection on a document or you could also create an audio. In either of the cases, you must upload the reflection to your website.

a. The issues that I ran in to while completing the test were my interpretation of some of the questions, how to calculate energy losses for certain valves, and how to solve the first equation in general because I had not encountered a manometer problem that was similar to what the problem wanted me to solve for.
b. To complete the test, I used steps identical to the posted test solutions from previous semesters. I separated each solution in a logically ordered and labeled manner, used known equations and gathered all data and equations from a reputable source. I also used my notes from class and homework problems to help solve problems.
c. The concepts that I have learned include the basic nature of fluids and fluid properties within a fluid system and how to compute different characteristics for them. I have also learned how to use certain characteristics to determine the design specifics for systems.
d. I think engineers use these concepts in the real world when designing fluid mechanical systems in many fields like coolant systems, fuel systems, refrigeration systems, and any other piping system application.
e. I will be using the things that I have learned in my career. If I have to determine a pipe size for a system in order to provide a desired flow rate, or a manometer to determine the pressure difference between two different points in a system.
f. Yes, I believe what I learned is important for my professional career because I will know how to solve for specific characteristics of piping systems when troubleshooting or designing systems.
g. I will use this information in the industry in the future. I currently work in the defense industry as a Nuclear Mechanical Engineering Technician and all the things I am learning are relevant to my current occupation. I can see even now how the things that I am learning in this course can be applied and will continue to be applied as I further my career and move on to other positions within the industry.
h. Yes, I have been able to apply what I have been learning. In my current position I test fluid mechanical systems for certification and while I had a general understanding of how fluid systems worked, I didn't have the in-depth knowledge that this course is providing me. I never knew how to calculate flow rates and fluid velocities based of pipe sizes, but now I do. I also never knew how to calculate the power of pumps and pump head or how a manometer exactly worked, but now I do.
i. The area that I have improved the most since starting to learn these problems is how to think critically about how to solve a problem. When I first started, I was really confused at where and

how to start these problems but now that I have done several, I am able to identify areas to start and walk-through problems easier than before.

j. This course will tie into my field directly. The information that I am learning in this course can make me an expert in what I do, since what I do is literally only work with fluid mechanical systems.

k. I spent a considerable amount of time on this test. All in all, I would say around 3 to 4 days with working on it in the mornings before work and in the evenings after work. The time was organized by simply working on it any chance that I had. This was because of the length of the test and because there were some things I either had not done thus far in this course or didn't see the similarities immediately. I also spent a good amount of time due to not having used excel in a considerable amount of time. The things that I would do differently were mentioned above and unrelated to how I spent my time on the test. There is nothing I would change in that regard since I am rather restricted to when I can work on it and I prioritized and started working on it the first day that it became available.