

Test 3 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.
 - In this exam, we are covering the following course objectives: Describe the nature of fluids and define different fluid properties such as viscosity and pressure (this is present in both problems and is required to define parameters and set the problems up appropriately); explain fluid dynamics in pipes and fittings (this is used in both problems to correctly account for the losses the system experiences); apply the principles of conservation of energy and mass to fluid flow systems, compute friction losses in pipes (this is required in both problems and is the backbone of the formulas we used to account for different branches); compute friction losses in pipes (this is used in all of the problems and is required to correctly account for all losses)
- 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?
 - In problem 1, my friction factor was slightly off, I used an incorrect value for the k of the valve, I had a couple of errors when inserting in excel and I used water at 15 degrees Celsius. My excel iterations did not take nearly as long because I incorrectly solved this problem at first and had a good idea of what the flow rate would be. My process was correct, and my answer was reasonably close. When asked if the Q s were the same, I took that literally. My flow rates were close.
 - In problem 2, I had calculation errors in my losses (basic algebra). This distorted my answer about 10 GPM. My process was correct. I think I make mistakes when I set up the iteration for my friction factors as they seem to converge too quickly and have minor errors.
 - Overall, I think my understanding and application of the test material was very good and need to become more proficient with excel.
- 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?
 - I think I would earn an A. I feel that I utilized the notes provided in class and was reasonably close on most of my solutions (some rounding and temperature use differences.) My biggest weakness was setting up everything in excel. I had virtually no experience with it prior to this course and I am still learning how to use it correctly. My biggest strength was successfully using Bernoulli's equation and properly converting all velocities to Q .

4) Discuss the following:

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

- Learning from the first two exams, I broke my effort into chunks. However, the formulas were very involved and made it easy to make mistakes. It was very difficult to enter the formulas into excel and would often generate ridiculous answers. To fix this, I had to systematically solve each equation in excel to find the error point for each problem.

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

- Taking multiple days to revisit work and check over calculations saved me on this exam. This kept me fresh as I handled the large equations. This is something I would continue to do.

c. What new concepts have you learned?

- I now have general ideas of what real system values should look like. I think this will be very valuable in the real world. I also have a much better understanding of excel and realize the power of the tool.

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

- The first concept is something I think engineers use every day. Sometimes you just need a general value to get a solution going or can use general values to check against an answer you derive.
- The second concept is also something I will use in any computation moving forward. Linking equations together to solve multiple facets of a problem with a single variable change is very powerful.

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

- I will use these concepts when I am in United States Navy Test Pilot School next year.

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

- Yes, teaching yourself how to problem solve and not give up are two of the most fundamental skills one can have. This exam is a great opportunity to expand those skillsets and test your ability to adapt.

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

- Engineers solve tough problems. These exams have taught me tenacity and creative thinking when approaching a difficult problem.

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

- Yes, in this exam, I used both fluid mechanics and thermodynamic concepts to picture the problem sets at a fundamental level.

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

- I think my ability to break the exam into components and apply principle theory to structure the problem in an effective manner was above average in this exam.

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

- I think the technical aspects are relevant to flight test engineering given the flow of air is how an airplane fly. I also think the mindset required to do well in this class is essential in problem solving everywhere.

k. How much time did you spend on the test? How was the time organized? What would you do differently? Why?

- I spent ~11 hours on the exam. A decent amount of time was spent deriving and checking the equations, but a majority was just correctly using excel. If I were to take this test again, I would have asked for a one-on-one meeting to successfully construct formulas in excel.

Self Grade:

1. PROBLEM 1

- | | |
|---|--------|
| 1. Reasonable assumptions (reductions, valve, tubing diam, lengths) | 1/10 |
| 2. Apply Bernoulli twice or get 2 equations from Bernoulli | 1/10 |
| 3. Consider ALL minor losses? Handled them correctly? | 1.9/10 |

- | | |
|---|--------|
| 4. Handled correctly the pipe losses? | 1/10 |
| 5. Obtained 3 equations with 3 unknowns? | 1/10 |
| 6. Solved system of equations correctly (Excel?)? | 2.7/10 |
| 7. Final results | .9/10 |

TOTAL
9.5/10

FINAL GRADE:

$$(90) * (9.5/10) = 85.5$$

2. PROBLEM 1

- | | |
|---|--------|
| 1. Reasonable assumptions (reductions, valve, tubing diam, lengths) | 1/10 |
| 2. Apply Bernoulli twice or get 2 equations from Bernoulli | 1/10 |
| 3. Consider ALL minor losses? Handled them correctly? | 1.9/10 |
| 4. Handled correctly the pipe losses? | 1/10 |
| 5. Obtained 3 equations with 3 unknowns? | 1/10 |
| 6. Solved system of equations correctly (Excel?)? | 2.7/10 |
| 7. Final results | .9/10 |

TOTAL
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