

Test 1 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 required in both problems, primarily in Bernoulli's equation and in the Gamma (h)), compute the pressure and the forces associated with it in a stagnate fluid (this is highlighted in problem one when we use the Gamma (h) equation to calculate the height of different fluids inside a static manometer), apply the principles of conservation of energy and mass to fluid flow systems, compute friction losses in pipes (problem two hammers this concept and allows us to compute unknowns with given information, ultimately allowing us to make decisions on overall design.)
- 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?
 - On problem one, I did not account for the change in the specific weight of water due to it being less than a 1% change and used 62.4 instead of 62.2; however, this was incorrect usage of that rule and made my answer wrong. Next time, I will properly compute the change of specific weight due to temperature and use that in my equation. Also, on problem one, when I rewrote my solutions to my final document, the page with the explanation for minimum distances was underneath my notebook, and I completely forgot to copy it. Inexcusable. Solving problems and not including them in the answer sheet is amateur.
 - On problem two, I used an app to provide my friction factor due to the difficulty of seeing the moody chart. I checked the app prior to use and found it to resemble the moody chart results; however, I must have input a value incorrectly and got a bad friction factor of 0.0367 instead of 0.022. This made all my computations incorrect and caused issues throughout the rest of the problem. I recalculated with the appropriate friction factor (after the exam) and obtained the correct answers regarding the losses. I DID NOT account for the losses going in and out of suction; it slipped my mind and is inexcusable. I also placed my losses (h_L) on the wrong side of the equation and changed my Pump head to 24.589 ft instead of 33.49 ft. I did the same thing on the pressure at the inlet, recalculated, and got a correct answer. This simple formula construction error made my answers incorrect and wreaked havoc on my operational costs. I misread the price in the excel portion and thought it was per foot and not per 6 feet. This changed all my trendlines and overall analysis of the cost. Completely inexcusable, especially as an engineer. All these mistakes are stupid and, honestly, kind of embarrassing. I will not do this again. I can sort all of this by simply

checking work and not overlooking small detail. My advice would be “do the right thing, stop taking things for granted, and check your work.”

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?

- If grading off process, I think I would earn a A to B-, which could seem insane to say given that most of my answers were incorrect; however, with my explanation of my mistakes and the fact that the test was tied together, and that any mistake would ruin the rest, I think that grade area is fair. If the test is based of correct answers (which is in theory what matters) I would get a C or lower.

4) Discuss the following:

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

- It is easy to miss something when working a problem this long. Everything ties together and makes the information at hand confusing at times. I tried to break the problem down into manageable segments, and compute individually. This worked for the most part, just a couple dumb mistakes.

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

- I took multiple breaks while completing this exam. It helped me keep things straight and fresh. Next time, I will complete the test, then revisit it each day ensuring that I read the problem correctly and solved what it was asking for.

c. What new concepts have you learned?

- I have a deeper understanding of what real world engineering looks like. Solving a problem that you could encounter in the work force is a huge confidence boost.

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

- To me, this is a problem we could run into day 1 within the field. I think these concepts could be applied in the construction of new facilities or the design of a rocket. Anywhere a fluid is moving these concepts apply.

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, not only the technical skills, but the overall idea of problem solving and effective ways to approach problems.

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

- Calculating the usage of fuel, the effectiveness of airflow, or understanding pressure differences will all come into play at test pilot school.

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, the tenacity required to solve difficult problems is something I have used in almost every endeavor in my life.

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

- I feel that I have a good understanding of the concepts delivered in this class, I just need to continue to practice the application of them so I don't make silly mistakes.

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 ~7 hours on the exam. I was not very good with excel prior to this exam, so that took quite a bit of time to do. I completed problem 1, then 2, then pushed through the excel portion. I think I would have broken the test into smaller time portions. Because of my job, I make It count when I have time. Looking at the screen for 4 hours was too long and led to dumb mistakes.

Self Grade:

WRITING RUBRIC

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	1/10.0
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	10/10.0

PROBLEM 1)

1. Identify all unknown dimensions in drawing 1/7 out of 1/7
2. Cancel the distance with water (x) 1/7 out of 1/7
3. Solve for the gasoline distance (y) .7/7 out of 1/7
4. Correct excel spreadsheet 1/7 out of 1/7
5. Using excel, get mercury case 1/7 out of 1/7
6. Why results make sense and manometer length .7/7 out of 1/7
7. Final results .8/7 out of 1/7

TOTAL

6.2 /7 out of 7/7

PROBLEM 2)

1. Select pipe diameter using 3 m/s 1/8 out of 1/8
2. Compute all energy losses .2/8 out of 1/8
3. h_A and pump power .4/8 out of 1/8
4. Pressure at pump inlet .2/8 out of 1/8
5. Correct excel spreadsheet 1/8 out of 1/8
6. Pump power for 4 other pipe sizes .7/8 out of 1/8
7. Installation, operating, and total costs .7/8 out of 1/8
8. What is the best pipe diameter? 1/8 out of 1/8
9. Final results .7/8 out of 1/8

TOTAL

5.9/8 out of 8/8

FINAL GRADE:

$$10.0 + (80/2) * (7/7 + 8/8) = 90$$

$$= 74$$