The exam for unit 1 of this course demonstrated work towards multiple course objectives. I was able to work towards the second course objective by computing pressure and forces associated with a stagnant fluid for the second problem. I was also able to work towards the third objective of discussing what buoyancy is and determining object stability while floating or submerged in a fluid with the third problem. Additionally, it could be said that the entire test was proof of work towards the first objective of describing the nature of fluids and defining different fluid properties, as that was part of each problem on this test.

Results vs Solutions

Problem 1.

For the most part, the steps I took to perform the first problem lined up with the ones outlined in the posted solutions. The only mistake I made in the first part was to factor in the air. Even so, the increase that came from the air in my solution was small enough that it did not affect the final answer by much. During the second portion my calculations for the heights of each fluid were identical to those in the posted solution, but again the addition of the air in the system may have thrown off my answer. Additionally, I neglected to add the two heights of mercury into one term and I did not distribute the specific weight of water across all terms before solving the equation. I included the air and neglected to distribute the value for specific weight of water because I drew upon my practice on a similar example problem and these steps were not included in that. I should have omitted the values for the height of air and factored in the specific weight of water. I would advise myself to take my time when solving this problem again and perhaps do more research on these types of u-tube manometer problems so that I may be prepared for more difficult ones than those done in class.

Problem 2.

For the second problem, my methods for finding the forces due to each liquid were sound but I made a mistake when finding the positioning of the forces. Instead of using ⅓ of the height of the liquid I used one half. I did this because I was looking at the liquid in the free body diagram more as a square instead of a triangle as it was presented in the posted solutions. Through my math to find the values of each part of the FBD I did not form the most efficient/accurate equations to put into the spreadsheet to find the forces on each component; I got carried away with using the exact values rather than looking at it from a variable point of view. I would advise myself in the future to think about the FBD of this problem more critically and take more time trying to understand it rather than running the numbers to quickly put into a spreadsheet. I would also advise myself to make a more organized graph when putting the spreadsheet together.

Problem 3.

For the last problem, I did not approach it as analytically as I should have to complete it effectively. I instead tried to take my knowledge of the most recent lab report (stability of a floating vessel) and tried to cram the values and requirements of the problem into the equations given for that report. While I think my results may be somewhat reliable and successful in a sense, I do not believe that what I obtained was truly what the problem was asking for. I would advise myself to take more time on the problem as well as allow myself more time to contact the professor to ensure the solution that I was working on truly fit the criteria of the solution that would be required. Again I would advise myself to also make a more detailed and clear graph to display my results.

Rubrics

Problem 1	
Gamma*h Technique	1/6
Pressure in Air is Constant	.5/6
Use of Values with Units	.5/6
Fluid Levels in pt.2	1/6
Same Equation	1/6
Final Results	**5/6**

Problem 3	
Fb=W	1/7
COG/COB	1/7
Distance to M	1/7
Metacenter vs COG	.5/7
Spreadsheet	.2/7
Results	.8/7
Plots	.4/7
Final Results	**4.9/7**

Problem 2	
Correct Fluid Forces Equations	1/7
Correct Equation for Gate Force	1/7
Sum of Moment	.5/7
Sum of Forces	.8/7
Spreadsheet	.4/7
Results	.9/7
Plots	.4/7
Final Results	**5/7**

Using the rubric above and the formula provided by Dr. Ayala, I have calculated my grade on the test to be 67.43%. I would say I was strong in the set up and problem solving of the questions on the test but my biggest downfalls were the spreadsheets and making sure that they were in accordance with what was required.

I think that the only issue that I ran into while taking this test was a lack of time. I did not give myself ample time to look over it, consult notes and homeworks, and contact the professor if need be. Instead I attempted to finish it in one day while I had other things going on and that proved to be not very effective. I would change my approach and start it earlier and maybe try to spread it out at least over a couple of days. I have learned a lot of new concepts such as how static pressure can affect components of things like gates and hinges, how pressure is trapped in air in u-tube manometers, and how we can use spreadsheets to run numbers and display results more effectively. I imagine engineers often use these concepts when designing components or mechanisms that will be in contact with fluids often, and also use excel to display results and run multiple sets of numbers and values without having to do them line by line. I think I will use a lot of what I have learned to move forward in this course and other courses in this program. I believe that what I have learned is important because I could use it in my professional career when faced with a large set of values that need to be calculated or even tasked with designing something that could deal directly with the concepts and nature of fluids that I am learning about now. I have been able to apply this knowledge to the lab attached to this course as well as some other courses I am taking now such as design of machine elements. I felt that I was most successful in the set up of problems and equations. I could see this material aiding me when it comes time for me to design mechanisms or take complex measurements involving fluids.