Self-Grade Assessment Test Two:

WRITING RUBRIC

1. Purpose	0.5/10.0 out of 0.5/10.0
2. Drawings	1.0/10.0 out of 1.0/10.0
3. Sources	1.0/10.0 out of 1.0/10.0
4. Design considerations	1.0/10.0 out of 1.0/10.0
5. Data and variables	0.5/10.0 out of 0.5/10.0
6. Procedure	2.0/10.0 out of 2.0/10.0
7. Calculations	2.0/10.0 out of 2.0/10.0
8. Summary	0.5/10.0 out of 0.5/10.0
9. Materials	0.5/10.0 out of 0.5/10.0
10. Analysis	1.0/10.0 out of 1.0/10.0
TOTAL	**10.0/10.0** out of 10.0/10.0

1. Design of buoy to open gate
    a. Hydrostatic force on the gate
        i. Magnitude and location 1/4 out of 1/4
    b. Solve for buoy force with moment conservation 1/4 out of 1/4
    c. Using buoyancy, get sphere diameter. 1/4 out of 1/4
    d. Buoy stability 1/4 out of 1/4
2. Pipe-elbow forces
    a. Free body diagram and correct forces 1/4 out of 1/4
    b. Handling of the pressures 1/4 out of 1/4
    c. Force in x 1/4 out of 1/4
    d. Force in y (weight) 1/4 out of 1/4
3. Flow-nozzle flowmeter pressure drop
    a. Right equation and A1/A2 1/2 out of 1/2
    b. C value 1/2 out of 1/2
4. Open-channel design

a. Correct equation 1/2 out of 1/2

b. Area and hydraulic radius 1/2 out of 1/2

5. Water hammer & cavitation
   a. Water hammer
      i. Wave velocity (units?) & pressure increase 1/4 out of 1/4
      ii. Operating pressure & Max pressure 1/4 out of 1/4
      iii. Pipe thickness 1/4 out of 1/4
   b. Cavitation
      i. Lowest pressure 1/4 out of 1/4
6. Drag force on object at the bottom
   a. Right eq: Fdrag>Ffriction 1/4 out of 1/4
   b. Correct area 1/4 out of 1/4
   c. Correct velocity 1/4 out of 1/4
   d. How Cd was obtained? 1/4 out of 1/4

FINAL GRADE:

(if everything is correct)

10.0 + (80/6)*(3/4 + 2/4 + 2/2 + 2/2 + 2/4 + 1/4) = 90

10.0 + (80/6)*(3/4 + 2/4 + 2/2 + 2/2 + 2/4 + 1/4) = 63.3

KEY

Complete
Wrong/Incomplete
Final Grade without homework

Test Reflection Questions:

1. In reference to the course objectives, this test demonstrates the following learning objectives: discussing what buoyancy is and determining the stability of an object, identifying and solving industrial problems such as cavitation and water hammer, and computing pressures within a system. In the first question, we are asked to find the diameter of the buoy to ensure that this number will make sense with regard to stability. In the first question of part e, we are asked to find the pressure increment after the sudden closing of the pipe. This answer would lead to the explanation of if the pipe would fail due to water hammer. We are then asked to determine if cavitation is possible within the system due to the pressure in relation to the saturation pressure. In part b of the first question, we are asked to determine the forces in the x and y direction of the pipe. To do this, we must find the pressure at the exit of the tank due to the relationship of this pressure to a force in the x direction.
2. For question one, I was able to recognize that there was a moment acting at the gate. This moment would lead to the relationship between the force on the gate and the force due to buoyancy. This buoyancy force would eventually lead to the diameter required to open and close the gate at that required elevation. I would find that I calculated the force acting on the gate correctly but would calculate hc incorrectly. I also was able to calculate the area correctly for the force on the gate equation. Determining the lengths is what threw me and my calculations off. I assumed the hc to be the height .9*h. This assumption was incorrect. If I were to of calculated Lc and hc correctly, the answer to my problem would have been correct as I had the right thought process. Question two, the one thing that I was confused about was the relationship of the weight to the forces. Since weight was neglected in the first question, I would lead myself in the wrong direction. I had the right thought process later on as I worked on the test and thought about the placements of my points. My issue with question three was determining the correct way to obtain A2. This was the minor mistake that cost me the problem. My process for solving part d was mostly correct, the only thing I missed was an algebraic error. In part e, I did not convert to the correct units correctly. This is mostly for determining the C values in m/s. I also assumed that I needed to calculate the pressure used in the equation given to determine the max pressure. I used the thickness given in the book for a steel pipe instead of calculating this value. Part f was the correct thought process but the incorrect equation. I knew there had to be a relationship and overthought the physics of this question. This tendency to overthink led me to seek values that were not given and this confusion lead me to the assumption of the incorrect answer.
3. The chart listed above is titled Self-Grade Assessment Test Two. The strengths of my test consisted of my ability to follow a lot of my calculations in the right directions for each of the parts I did answer. My weaknesses in the test occur from overthinking information that was not necessarily needed to calculate the needed values.
4. Answers to the following questions in part four.

a. This test was better to comprehend than the first test. I carried the same thought process that I had to learn for the first test. I had to do a lot more thinking of how to get the values needed to calculate the problem than trying to understand what the problems were asking as I did in the first exam. To overcome this challenge, I simply took a step back from the required equations and thought about what was really going on in the problem. It seems if I were to always do this I would not spend as much time thinking.
b. I would not change my process for completing this exam. I carried out my time very effectively to sets days for thinking and others for calculating. I really like the method that the pretest delivers. It helps students to think about the problems instead of jumping into calculations. I will use this same technique for years to come.
c. In this test, I learned how to find the required diameter of a buoy needed to open a gate based on a specific fluid. I also learned how to engineer an operation so that cavitation or water hammer will not occur.
d. Engineers may use these concepts for designing gasoline pumps, swimming pools, water parks, and submarines.
e. If I am ever a submarine officer or engineering duty officer, I may use these concepts to prevent cavitation to occur in the Navy. This is due to the loud noises cavitation can arise.
f. Everything that I have learned in this course already has provided me with tremendous insight that will relate to my professional career.
g. I can use this information as a Naval Engineering Officer to design efficient fueling systems for military transportation.
h. I have not been able to apply any concepts in other current courses I am currently taking.
i. I felt I was most successful in thinking about the backstory of each problem. This is important in that it helps you head in the right direction when solving the issue. I also improved more on thinking about the physics in each problem.
j. Eventually, I would like to work at Lockheed Martin to design and manufacture aircraft. Understanding pressure and most importantly Bernoulli's principle takes part in designing these aircraft.
k. I spent around 36 hours on this exam. My time was organized effectively and I would not do anything differently.