Self-Grade Assessment Test One:

WRITING RUBRIC (APPLIES TO THE WHOLE TEST, NOT TO PARTICULAR PARTS)

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

Part 1a)

1.	Show drawing with Bernoulli's points and reference	1/8 out of 1/8
2.	Apply Bernoulli's, simplify it, and solve for "h"	1/8 out of 1/8
3.	Compute velocity with Q=VA	1/8 out of 1/8
4.	Compute pipe energy losses correctly (estimate L)	2/8 out of 2/8
5.	Compute minor energy losses correctly	1/8 out of 1/8
6.	Create spreadsheet with all calculations	1/8 out of 1/8
7.	Correct results?	1/8 out of 1/8

Part 1b)

1.	Select U-tube tubing diameter	1/6 out of 1/6
2.	Decide U-tube right leg length	1/6 out of 1/6
3.	Apply "gamma*h" equation and solve for "h" of Hg	2/6 out of 2/6
4.	Mass or volume of required mercury	1/6 out of 1/6
5.	Correct results?	1/6 out of 1/6

Part 1c)

1.	Compute transferred volume in 5 minutes	1/4 out of 1/4
2.	Use cylinder volume equation and get tank diameter	1/4 out of 1/4
3.	Compute percentage of the energy losses	1/4 out of 1/4
4.	Correct results?	1/4 out of 1/4

Part 2)

1. Use spreadsheet from "Part 1" to get "h" for diff Q
   Make sure the K value or Leq value of valve changed

	Make sure energy losses change when changing Q	2/8 out of 2/8
2.	Plot “h” vs Q	1/8 out of 1/8
3.	Read Q for “h” equal to the “h” in part 1	1/8 out of 1/8
4.	What is the new manometer reading?	1/8 out of 1/8
5.	%drop of the gasoline level after 10 minutes	1/8 out of 1/8
6.	Compute percentage of the energy losses	1/8 out of 1/8
7.	Correct results?	1/8 out of 1/8

FINAL GRADE:

If getting everything right:

10 + (80/4)*(8/8 + 6/6 + 4/4 + 8/8) = 90

10 + (80/4)*(4/8+2/6+3/4+7/8) = 59

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: describe the nature of fluid properties such as pressure, computing pressure, explaining the fluid dynamics in pipes and fittings, applying Bernoulli’s principle, and computing friction losses. In the first question, we are tasked to find the height of gasoline inside a cylindrical tank. To find this height, we must use Bernoulli’s principle since the fluid at the bottom of the tank is in motion toward the gate valve. We also must have an understanding of pressure and computing pressure to understand that these pressure are zero at the preferred areas of reference. Using Bernoulli’s principle, we must also note that there is a head loss and pipe loss to add to the equation. Through this, the topics of both pipe and friction losses occur.
2. For question one, I used Bernoulli’s to start and canceled out the correct terms according to my reference. The first error I made was that I failed to realize that the height I was calculating was the height plus the 0.5 meters. I computed the correct velocity using the

volumetric flow rate equation. For the length, I did not realize that I needed to assume a length until reading the exam solutions. This mistake would create the mistake in my calculations of not including the friction losses due to the pipe. Comparing my answer to the fT value, I found this number using the tables which would be very similar to the answer calculated in the solutions only with more significant figures. For the total minor loss, the solutions considered the friction losses at the entrance, the pipe, and the elbow which I only would consider the head loss from the ½ open gate valve. Not considering there other two friction losses would also give me an incorrect value close to but not the same height as calculated in the solutions. In part b of question one, I left out the needed variables to find the correct height, length, and volume of the manometer. I did not select a tube diameter but I did incorporate the equation of pressure change due to a static fluid. Lacking a diameter, I would not be able to continue and find a length that would have helped me to find the volume of mercury. Part C of question one consisted of only minor errors in conversions. The problem would have been correct if I had converted the liters to meters cubed. For the second question, I had the correct thought process just different numbers for the variables calculated in question one. My graph was extremely similar to that of the solutions.

3. The chart listed above is titled Self Grade Assesment. 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 missing specific information that at the time I could not figure out how to get.
4. Answers to the following questions in part four.
    a. To complete this test, I had to input a lot of thought into understanding what the problem is asking me. It took me a while to understand that I needed to engineer this system on my own which I have never seen before on an engineering exam. Some parts of assuming a length based on logic still did not click on me until after the solutions were posted. To troubleshoot these problems, I spent a lot of time thinking about what the questions is asking, understanding the physics behind it, and most importantly not stressing myself out. For the solutions I did solve, I tried and put my best efforts into solving them.
    b. To complete the whole test, I used my week given in a very timely and effective manner. I prioritized getting what I wanted to complete and would not stop until I felt content with where I left off. If I were to change something, I would provide myself more time to rest as there would be days during the week I would sit and try to figure out certain questions for hours at a time.
    c. From the test, I learned how to design a U-tube manometer in correspondence with a fuel truck that is receiving gasoline from a tank. I learned how to tie in everything that was listed in the course objectives mentioned to solve and logically evaluate my design.

d. These concepts can be applied to designing a specific water flow for a bathroom entering a house that an engineer may be designing.
e. When I work in the industry as an engineer or ever decided to get my PE, I can use these concepts to assure the safety of a specific design already engineered or a new fluids-related design to engineer a new product.
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 to construct and design piping systems in houses during new construction periods anywhere in the United States with a professional engineering license (PE).
h. I have not been able to apply any concepts in other current courses I am currently taking.
i. I feel I was most successful with solving the required variables in a problem and need to improve on understanding the background information prior to jumping into solving a 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 48 hours on this exam, this does not mean two days with breaks. During the entire week, the test was available, I devoted two days to completing it. My time was organized properly although there were some points I should have taken more breaks. These breaks would have given me more time to think and fully understand what the problem was asking. Even when I did take somewhat of a break, I found myself thinking about solving problems for the exam which can also lead to some stress.