Erich Schimpf Test 1 reflection

Problem 1

The first problem of the exam was an extension of a pressure problem that was presented in class. In the problem, we had to find the minimum height of the manometer if the oil was swapped with another fluid. While the problem looked very intimidating at first, it was in practice a very straight forward example of the pressure equation, where instead of solving for pressure, you are solving for a known. For me, the majority of time spent on this problem was spent on determining a plan of attack of sorts. I started the problem by listing as many knowns as I could.

I stated that, through visual inspection, Pa is greater than Pb. I also was operating under the pretense that, since the SG of gas was lower than the oil used, the height of the manometer would be much higher than the one using oil. Additionally, I operated under the idea that since the SG of mercury was much higher than that of the oil, the height would be much shorter. This seams to have been incorrect, as per the solutions posted. As of writing this (Saturday the 19th), I still don't quite understand why, and plan to ask in class Tuesday.

Going forward, I made the correct determination that pressure difference would be equal to the pressure equation we derived in class. I originally moved to plug in the individual pressures at each point, but by looking at the solutions I can see that this was unnecessary. Additionally, I did not convert the delta in pressure to lb/ft^2. Other than that, my method of determining the pressure was almost exactly to what was listed in the solution. Overall, I spent around 2-3 hours or so on this problem, with about 1/3rd to half of that just being in research and analysis of the problem before attempting to solve it. If I were to attempt this problem again, I believe that I definitely could have figured it out and obtained a correct solution.

In my opinion, I found it very easy to get overwhelmed with the scope of the problem, and overlooked very simple steps that would have gotten me a correct solution.

Identify all unknown dimensions in drawing	1/7 out of 1/7
Cancel the distance with water (x)	.75/7 out of 1/7
Solve for the gasoline distance (y)	.5/7 out of 1/7
Correct excel spreadsheet	.8/7 out of 1/7
Using excel, get mercury case	.8/7 out of 1/7
Why results make sense and manometer length	1/7 out of 1/7
Final results	.8/7 out of 1/7

Total: 5.65/7

Problem 2

This problem took me considerably longer to complete than problem 1. Again, I believe the majority of time spent on this problem was spent determining a plan of attack. Once the principles of the problem are decomposed, its fairly straightforward and simple. The first part, finding the optimal diameter to get a fluid velocity of 3 m/s with the given flow rate, was definitely an appropriate starting point. I was able to find the required area, and corresponding pipe diameter with ease.

In my opinion, the second part was not only the most involved, but the hardest to identify that plan of attack with. It required a complete understanding of the concepts of Bernoulli's equation- just a basic application could work but would make the problem needlessly complicated.
I spent quite some time determining the points so that as much would cancel as possible, ideally pressure and velocity. Therefore, I placed my points at the top of each tank, which seams to be the correct choice.
After selecting these points, I was left with the pump head, the losses due to friction, and the relative locations off the reference axis.

Going off the solution, I did an excellent job of identifying, dissecting, and calculating the losses due to friction, I am in fact quite proud of myself that I was able to get this far.
The only way I deviated from the solution was in calculating Reanolds number, where I just assumed the velocity to be the value for the entrance/ exit loss.
Even with this mistake, however, I was able to get an extremely similar pump head to the solution- my value of 33.3' vs the solutions 34.3'.
I found the energy required to be .34 Kw, vs the solutions .35 Kw.
The only real misstep I had in working out the problem is a misunderstanding of what pressure was to be calculated. It seams by the solution the pressure at the pump was to be calculated, but in my exhausted state I glossed over this as pressure at the point, which is why I answered 0.
In the final tables, which I generated through excel, the conclusions were exactly the same as the solutions. My graph of costs between the different sizes of pipe looks almost identical to that of the solutions. The only difference was that my estimation of cost was slightly higher than that of the solutions, likely because of how I incorporated percentages to overestimate.
All in all, my solution was in reality very close to that of the answer keys- with the only differences being purely nominal, along with the solution being in metric with my solution being in feet. Going off the 10% rule of thumb discussed in class, id estimate my solution to vary less than 10%, which I consider a success.
Seeing as I spent probably the better side of 10 hours on this problem, I am very happy with my work and solution, and quite proud of myself.

While this test was at times very frustrating and overwhelming, the challenge and rewarding nature of finishing was very refreshing. Even though I am taking a heavy course load, the work I have generally speaking for my classes is more or less busy work- and the work for this class is definitely not that. I might not have gotten every problem correct, but I was very happy with my approach and method of tackling this work, and left feeling very satisfied. While this class might not be the easy A some people look for, this test shows me that hard work in this topic pays off, and I most definitely feel that I earned my grade, which I feel I will be very happy with after this reflection exercise.

Select pipe diameter using 3 m/s	1/8 out of 1/8
Compute all energy losses	1/8 out of 1/8
h_A and pump power	1/8 out of 1/8
Pressure at pump inlet	0/8 out of 1/8
Correct excel spreadsheet	1/8 out of 1/8
Pump power for 4 other pipe sizes	1/8 out of 1/8
Installation, operating, and total costs	1/8 out of 1/8
What is the best pipe diameter?	1/8 out of 1/8
Final results	1/8 out of 1/8

Total: 7/8

Purpose	0.4/0.5/10.0
Drawings	1.0/1.0/10.0
Sources	1.0/1.0/10.0
Design considerations	1.0/1.0/10.0
Data and variables	0.4/0.5/10.0
Procedure	1.8/2.0/10.0
Calculations	1.8/2.0/10.0
Summary	0.5/0.5/10.0
Materials	0.5/0.5/10.0
Analysis	1.0/1.0/10.0

Total: 9.4/10

Total Grade:

9.4 +(40*1.6821)=76.68/90= 85%