

Reflective essay

Test 2

Nathan Chernys

1. The test reflects my understanding of course objectives that pertain to how to apply and use the 1st law, how I understand Rankine cycle, superheating, regeneration and cogeneration as well as a decent understanding of how gas turbines and vapor systems function.
2.
 - a. In Problem 1, the errors I made in calculations were related to the distribution of the mass fractions. I managed to figure out that $y = 0$ due to the pressure and sat. liquid state, but nothing further. In the end, I assumed that the mass flowing from “w” would flow back up and go into the “y” line meaning that even though the mass flowing into “y” is 0, if “w” is added it becomes a real mass. The reason behind this assumption was based on the idea of following the path of least resistance, because if the pressure builds up next to the steam trap, the path of least resistance would be to go back through a premade pathway. This mistake in assumption led to using an incorrect “y + w” and resulted in an incorrect “z.” as a result of the mass fractions being off it affected the cooling temperature to be off slightly as well as significantly affect the net work and heat in and out. To correct the mistake that led to the failure of this problem, I should have gone with the original assumption of $y = 0$ and simply plugged that into the equation instead of trying to understand where the mass of “w” goes to. By trying to do the latter, it impeded my thinking on how the system is functioning and confused me to something I should have seen that is rather obvious. If I were to take the test again, I would advise myself to trust myself and the process I have honed through the class, because the answer was very close and if I was more confident in my answer and didn’t overthink the distribution of mass I could have possibly done better.
 - b. In problem 2, I used the same PV and Ts diagrams to solve it and simply crossed out the parts that were broken. I did not consider that a new PV and Ts diagram were necessary nor even that new states and calculations were necessary. I thought that it would be sufficient to state which states are not included. Aside from the aforesaid error, I made a similar mistake as I did in the previous problem with mass fractions which resulted in significantly incorrect solutions. I assumed that with “w” and “z” blocked, and the heat exchangers still working the remaining mass would flow back up and into the next stage of the turbine. The reason for this assumption was that if the mass is blocked and has nowhere to go, and the more the cycle continues the more pressure builds and therefore that fluid mass must travel somewhere. To find the correct solution for mass fraction of y, I

should have not overthought the whole process. The solution was to take the 1st law around the mixing chamber, I overthought the entire process and continued to think the other mass fractions remained making it much harder than it needed to be. If I were to take the test a second time, I would advise myself to focus on how mass fractions flow in a system and to not overthink about exactly what is happening to all other parts of the mass.

3. Grading:

1. Purpose	0.5/10.0
2. Drawings	1.0/10.0
3. Sources	1.0/10.0
4. Design considerations	0.5/10.0
5. Data and variables	0.5/10.0
6. Procedure	1.5/10.0
7. Calculations	1.0/10.0
8. Summary	0.4/10.0
9. Materials	0.5/10.0
10. Analysis	0.9/10.0
TOTAL	7.8/10.0

PROBLEM 1)

1. P-v and T-s diagrams	1/10
2. Realize that some states are not needed	1/10
3. State calculations (at least 11 of them)	2/10
4. Calculate "y" and get y=0	0.5/10
5. Calculate "z"	0.5/10
6. Calculate deltaT water	1/10
7. Thermal efficiency (Wnet & Qin)	2/10
8. Final results	0.5/10
TOTAL	8.5/10

PROBLEM 2)

1. P-v and T-s diagrams	0.5/9
2. Realize that some states are not needed	1/9
3. State calculations (at least 8 of them)	1/9
4. Calculate "y"	0.25/9
5. Calculate deltaT water	1/9
6. Thermal efficiency (Wnet & Qin)	2/9
7. Final results	0.5/9
TOTAL	6.25/9

$$\text{Grade} = 7.8 + (80/2) * (6.25/9 + 8.5/10) + 9.5 = 79.08$$

The reasoning behind these scores is that my design considerations and data and variables sections are present, but they are scattered all over the calculations pages. My procedure is mentioned, but it is also vague and nonspecific to proper steps to finding the solution, but in the test, there is a procedure though not mentioned distinctly, the problem is

organized. While there is some organization, it still cramped making the calculations and notes difficult to read. The summary is present throughout the problems making clear note of assumptions, procedure, and calculations, despite that fact some of the assumptions are incorrect. The strengths demonstrated in the test show the clear understanding of the material, equations and application skill that I have grasped. With each step of the problem explained in detail and why equations are used and set up. However, this ties into the weakness shown on the test, which is my overthinking, leading to the wrong assumptions. Furthermore, assuming uncertain things and processes.

4. In the exam, the issues encountered were correctly analyzing the distribution of the mass fractions in a malfunctioning system. To solve this issue, I analyzed and assumed a possible fluid mass distribution and solved with that assumption in mind. In completely this test, I tried to complete it methodically, but I realized that made me overthink it too much and if I could change it, it would be to a procedural method and take it step by step. As a result of this realization, I realized taking a step back from the problem and relaxing can be more helpful in solving it than forcefully spending days intensely focusing on the problem. By taking a step back, I can move two steps forward. I think that engineers use this specific method of thought when they are presented with a problem that seems impossible. In the test, In order for to understand what is happening in one closed feed water heat exchanger, looking at the whole by taking a step back and not focusing on the extraneous parts of the system can help understand the problem even better. I believe this can help me to use in the workplace when presented with a difficult problem. This is a life skill that will be immensely useful when I am struggling with something unfamiliar; by taking a step back from the problem, I can focus on the basics and what is actually happening in any given problem I may be struggling with. Though I have not been able to apply this skill quite yet in other courses' tests, I have used it to better understand theories I have struggled with in the past by understanding the basics through a wider perspective. In this test, I have learned a lot and found ways to improve; with that in mind I was succeeded in improving in my organization from the previous test. My time spent on the test was divided into 4-6 hours a day for 3 days. The lesson's I learned from this test as well as the content taught in the course will be very useful and helpful in my field and career because it is the core of it. The essence of what I want to do is in this course and by understanding how to solve, organize, and recognize my own faults furthers my career.