

On this test I worked toward a few different course objectives. However, the main one was applying Rankine Cycle with superheating, re-heating, and regeneration to steam power plants. This was used in both questions for this test. Both questions were using Rankine Cycles because they were the same question just one was with more damage than the other.

When comparing my solutions to the provided solutions I found that my answers did not line up really at all with the provided solutions. When solving for y and z I got the wrong y since when I was going through and doing this test I for whatever reason got a different h_3 than h_4 . This led me to have the wrong y which then led to the wrong z because to find z you needed y . However, I did use the correct equations and for z if my y had been correct, I would have gotten the correct answer. For the next part I put in the wrong units thinking I was working in Celsius instead of Kelvin even though the numbers I had had Kelvin in them. My answer was off by a bit due to the incorrect y and z and of course the incorrect unit. Finally for the thermal efficiency my answer was pretty close, but was also off due to the incorrect y and z . For question two due to my incorrect enthalpy, I once again got y wrong, but was using the correct method to get it. Also due to my incorrect y even though I was using correct methods my change in temperature and thermal efficiency were off.

While completing this test, my main issue was poor time management. I began the test late on Saturday night, which caused me to work while tired and led to avoidable mistakes. I didn't give myself the best conditions to perform well. If I were to do it again, I would schedule the test during the day when I'm more alert and focused and take breaks between sections to maintain my concentration. Despite these setbacks, I better understood Rankine cycles and how to apply thermodynamic principles to energy systems. My steps to complete the test involved moving through each problem in order, solving as best as possible, and then revisiting any unclear parts. In hindsight, I would organize my time more deliberately, maybe dividing the work into smaller sessions to prevent fatigue and give myself time to double-check calculations. One of the main concepts I learned from this test was how to evaluate and track thermodynamic properties like pressure, temperature, and enthalpy throughout a Rankine cycle. I also improved in setting up energy balances more confidently and selecting the correct equations for each scenario. While I don't currently use these skills at my job in a tennis facility, I understand their importance for my future career. As a mechanical engineer, I may work with thermal systems, and the ability to analyze energy cycles will be critical in that field. I believe the knowledge gained is foundational for any professional working with energy systems, and it will be useful in roles that involve sustainability, system efficiency, or equipment selection. This course is already helping me approach problems in other classes more methodically. I've started identifying variables and breaking down problems into solvable steps, which is a noticeable improvement. The area where I was most successful on the test was gathering and organizing data for problem-solving, something I struggled with earlier in the semester. The course content intersects well with my future interests in mechanical systems and possibly renewable energy. Understanding thermodynamics is crucial for evaluating the feasibility of such technologies. I spent about four hours completing the test, but the time wasn't well organized. I worked late into the night and rushed through the end without reviewing my answers. In the future, I plan to manage my time better, work earlier in the day, and pace myself with short breaks to stay sharp and reduce mistakes.

How I would grade myself:

Writing Rubric (whole test):

- | | |
|--------------------------|--------------------------|
| 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**

Problem 1:

- | | |
|--|--------------------|
| 1. P-v and T-s diagrams | 0.7/10 out of 1/10 |
| 2. Realize that some states are not needed | 0.8/10 out of 1/10 |
| 3. State calculations (at least 11 of them) | 2/10 out of 2/10 |
| 4. Calculate "y" and get $y=0$ | 0.3/10 out of 1/10 |
| 5. Calculate "z" | 0.7/10 out of 1/10 |
| 6. Calculate ΔT water | 0.7/10 out of 1/10 |
| 7. Thermal efficiency (W_{net} & Q_{in}) | 1.2/10 out of 2/10 |
| 8. Final results | 0.7/10 out of 1/10 |

TOTAL **7.1/10**

Problem 2:

- | | |
|--|------------------|
| 1. P-v and T-s diagrams | 0.7/9 out of 1/9 |
| 2. Realize that some states are not needed | 0.8/9 out of 1/9 |
| 3. State calculations (at least 8 of them) | 2/9 out of 2/9 |

- | | |
|------------------------------------|------------------|
| 4. Calculate “y” | 0.2/9 out of 1/9 |
| 5. Calculate deltaT water | 0.7/9 out of 1/9 |
| 6. Thermal efficiency (Wnet & Qin) | 1.6/9 out of 2/9 |
| 7. Final results | 0.6/9 out of 1/9 |

TOTAL **6.6/9**

Final Grade:

$$10 + (80/2)(7.1/10 + 6.6/9) = 67.73 \text{ out of } 90 = 75\%$$