Question 1

Test 2 demonstrates my work toward several of the course learning objectives, but the main objective that was addressed was to apply Rankine Cycle with superheating, re-heating, and regeneration to steam power plants. Both parts of the test involved a Rankine Cycle with most of the elements of a Rankine Cycle that were discussed in class. In order to understand any part of the problem, I had to know how a Rankine Cycle functions, specifically one experiencing regeneration. This test forced me to know how the Rankine Cycle functions in order to even come close to answering the questions. The course objective to develop an intuitive understanding of how to apply the first and second law of thermodynamics to different thermal systems also had to be applied to test 2. Part of understanding how the Rankine Cycle works is also understanding when it is best to use the first law to define parts of the system and answer the questions. I had to know how and when to apply first law to succeed with this test.

Question 2

The mistakes I made on the test all stem from misunderstanding the problem statement. When the problem statement said that the water flowing from the extraction points in the turbine is controlled in such a way that feedwater leaves the condenser, the open FWH, and the close FWH as saturated liquid, I took that to mean that only water that went from the extraction points at 7, 6, and 9 to the locations listed would be saturated liquid. From my logic, that would make state 7a, 3, and 1 saturated liquid because state 7 goes to state 7a, state 6 goes to state 4, and state 9 goes to state 1, and the condenser, open FWH, and close FWH are in between these states. My thinking was mostly correct, however instead of state 7a being saturated liquid, state 5, which also is leaving the close FWH, was actually the state that the problem statement was saying was saturated liquid, where I had assumed it was subcooled liquid and made assumptions about that state saying the temperature at state 5 (entering the boiler) was approximately the same as the temperature of state 7a (entering the trap), using knowledge I gained from a similar homework solution. The problem statement also states that the water leaving the trap is saturated liquid. I interpreted that as the water leaving the entire trap, confirming that state 3 was a saturated liquid because I knew that the trap had to be isenthalpic and I had already established that state 7a was saturated liquid. However, that statement actually meant that state 7b was saturated liquid, which makes sense looking back now. Because of some initial confusion on what the problem statement was saying, I got incorrect values for state 5, 7a, and 7b, specifically their enthalpy values. These enthalpy values also caused some other values to be incorrect, such as the thermal efficiency and the specific work in, however, my setup for these values was correct, so if I had the correct enthalpy values, these values would have been correct. My understanding for how to solve the problem was there, I just misinterpreted the given data, which is confirmed by my fully correct solution for the second problem. If I were to take the test again, I would make sure I firmly knew what the problem statement was telling me before starting on the problem, and confirm my assumptions by asking if I was having doubts.

Question 3

Based on the given rubric, I would give myself an 85.56 out of 90. I would take off 1 point out of 4 for the state calculations for problem 1 since I did not evaluate 3 states (5, 7a, and 7b) correctly out of 11 states. I would not take off any points for net work and thermal efficiency even though the answers do not match the solutions because the methods used to find these values are correct, but the numbers used to calculate them for state 5, 7a, and 7b are incorrect and I already took points off for those incorrect values. If those values had been correct, net work and thermal efficiency would also have been correct. Also the same conclusion was made when comparing problem 1 to problem, where problem 1 had a higher thermal efficiency and problem 2 had a higher net work value. I would give myself full points for problem 2 and the writing portion, leaving me with a total of 17/18 points and 10/10 points.

10.0 + (80)*(17/18) = 85.56 out of 90

With the homework my grade would be a 95.56 out of 100.

Question 4

a) The main issue I encountered during the test was deciphering the given information and figuring out what assumptions I could make. I used a lot of the knowledge I had gained from the in class problems and homework problems and solutions to make the best decisions I could about what the problem was saying.
b) I started to set up the test writing down what I knew and could find out and then solved. Once I started solving I realized I had made some mistakes and was confused about some of the assumptions I declared, but I had not allowed enough time to think through the problem again like I had before. To combat this, next time I would make some assumptions and knowns and start working based on that and then move on to the next section instead of writing down all the information before and then working it in two big steps.
c) I have learned how a Rankine Cycle works with several different configurations and how to interpret problem statements and given diagrams.
d) Engineers can use the information from this test whenever dealing with Rankine Cycles that can assume ideal conditions for a number of different configurations and included elements, specifically regenerative setups.
e) I will use what I have learned in the remainder of this class, in my other classes involving heat and system analysis, and most likely in my future job.
f) Yes I think what I have learned is important for my professional career, not only if I specifically deal with Rankine Cycles and power plants, but also when I do problem solving in general, which is what I will do whether I deal directly with Rankine Cycles or not.

g) If I am expected to work with Rankine Cycles in the future, I can most definitely apply the information I learned before, during, and after this test. Even if I am not working with Rankine Cycles, I will still understand them and their role and the effects of regenerative systems overall and how changing elements of a system changes their function.
h) Yes, I use a lot of the deduction and interpretation skills I learn in this class in other classes to help me understand problems and find solutions.
i) I feel like I generally understand how the inner workings of the Rankine Cycle function ideally, knowing when pressure and temperature rise and drop and where, and where it is safe to assume conditions when they are not provided, which is an improvement for me.
j) I think whatever type of engineering job I get in the future I will use the content of this class and test to be able to understand systems that I directly or indirectly will work with and will be a better problem solver. I also think this class is helping me become more knowledgeable overall about common engineering systems and cycles, such as the Rankine Cycle.
k) I spent a few days working on the test, with the last days of it being open really working on it and writing down the solution, and the first couple of days it was open I mostly spent thinking about it and grasping what the system was and what I was being asked to do. I wish I was able to spend every day that it was available working on it, but unfortunately I had other assignments due before it and another test due at the same time, so I started really working on it later than I was hoping. However, I feel I was more organized and on time when approaching this test than the previous one, so hopefully for the next one, I will be even better.