added or removed, as needed,

Problem 3.14: A 0.5 m^3 sealed rigid vessel contains 15 kg of water (phase unknown) at 120 °C. Heat is ~~added~~ until the steam becomes ~~saturated vapor.~~ a single saturated phase.
a) Determine the state of water before heating.
b) Determine the pressure and temperature at the end of heating.
c) Determine the amount of heat.
~~d) How much heat should be removed from the tank in order for the steam to become saturated liquid?~~

Problem 3.15: A 3 m^3 tank is divided into two parts via a thermally insulated wall. One part has a volume of 2 m^3 and contains a vapor-liquid mixture of steam, 7% liquid, at 5 bar. The other part contains steam at 10 bar, 500 °C. A valve is opened and allows the two parts to thoroughly mix.
a) Determine the final pressure and temperature in the tank assuming no losses to the surroundings.
b) Determine the amount of heating or cooling that must be supplied in order to make the final pressure 5 bar.

Problem 3.16: A closed tank, 1 m^3 in volume is filled with water at 1 bar 80 °C. A second identical tank contains 20 kg of steam at 20 bar.
a) What is the mass of water in tank 1?
b) What is the temperature and phase in tank 2?
c) The contents of the two tanks are mixed together in a third closed tank whose volume is 2 m^3. Heat is added or removed, as needed, to bring the final temperature to 175 °C. What is the final pressure?

Problem 3.17: An insulated cylinder is divided into two parts: one part has a volume of 5 L and contains steam at 1 bar, 200 °C; the other part has a volume of 2 L and contains steam at 2 bar, 400 °C. The partition that divides the cylinder is removed and the contents are allowed to reach equilibrium without heat losses to the surroundings.
a) Determine the pressure and temperature in the final state assuming steam to be an ideal-gas. Is ideality an acceptable assumption?
b) Repeat using the steam tables.

Problem 3.18: Wet steam with quality 63.1% exchanges heat in a closed system under constant pressure $P = 6$ bar. Determine the final temperature and the amount of PV work in each of the following cases:
a) The system is cooled by removing 1500 kJ/kg of heat.
b) The system is heated by adding 1500 kJ/kg of heat.
Report the work using the proper sign convention.