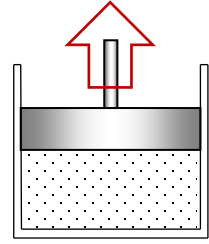Two kg of saturated steam vapor is contained in a piston cylinder at 200 kPa. It undergoes a constant temperature process until the quality is 0.5. The surroundings are at 101 kPa and 300 K.

(a) Find the work *out* of the steam for this process.
(b) Find the *useful* work out of the steam for this process.
(c) What is the *maximum* amount of useful work that can be extracted from the steam
    1. at its initial state?
    2. at its final state?
    3. between the two states?
(d) How do your answers to (b) and (c) compare? What does that mean?
(e) Calculate the heat transfer in or out of the system and the entropy generation using a good ole ConApps approach. How does $T_0 S_{gen}$ compare to part (d)?