Example

Let’s look at that air-standard Brayton cycle again. The following conditions still apply: compressor inlet: 100 kPa, 300 K; turbine inlet: 1 MPa, 1300 K. Now add an ideal intercooler and an ideal regenerator. (I.e., $T_b = T_1$ and $T_e = T_3$.)

(a) Sketch the $T$-$s$ diagram.
(b) Find the power (per unit mass flow rate) to the two compressors and the heat transfer rate (per unit mass flow rate) from the intercooler.
(c) Find the power (per unit mass flow rate) from the two turbines and the heat transfer rate (per unit mass flow rate) to the reheater.
(d) Find the cycle efficiency. What the heck?
Example

OK, so the efficiency went down. Well, now add an ideal regenerator to the system and let’s see what happens!

(a) Sketch the $T$-$s$ diagram.
(b) Calculate the new heat transfer rate (per unit mass flow rate) into the high-pressure heat exchanger and the new efficiency. Holy cow!