Problems from Ch. 18:

A system gains 10,000 J of heat and does 5500 J of work, starting at $U_i = 10^5$ J. What is its final internal energy? Answer: 1.045 $\times 10^5$ J.

At a constant 300 K a gas is taken from a volume of 0.01 m^3 to 0.1 m^3. If the gas has 10^{26} atoms, how much work did the gas do? Answer: 9.5 $\times 10^5$ J.

700 J of heat is added to a gas while its temperature is held constant at 400 K. Initially it has pressure 1.6×10^5 J/m^3 and volume 4 liters. What are its final pressure and volume? Answer: 5.4×10^4 J/m^3 and 11.9 liters.

A monatomic gas undergoes an adiabatic process, taking it from 400 K to 200 K. If its initial pressure is 1.6 $\times 10^5$ N/m^2 and its initial volume is 4 liters, what are the final pressure and volume? Answer: 2.85×10^4 N/m^2 and 11.3 liters.

A gas undergoes an isobaric process, during which its temperature changes from 300 to 400 K, at a pressure of 2 $\times 10^5$ Pascals. It also expands from 10^{-3} to 2×10^{-3} m^3. If the gas is monatomic, and there is one mole of it, what heat was added? Answer: 1447 J.

A gas absorbs 100 J of heat while doing 50 J of work.

Its initial internal energy is 500 J. If its initial temperature is 50 K, what is its final temperature? Answer: 55 K.

A monatomic gas at 10^5 Pascals expands isobarically from 1 cubic meter to 1.5 cubic meters, beginning at 300 K. What work is done by the gas? What is the final temperature? What is ΔU? What heat was added to the gas? How many moles of gas were there? Calculate C_p from the information supplied. Answers: Work done by gas, 0.5 $\times 10^5$ J. Final temperature 450 K. Δ U = 7.5 $\times 10^4$ J. Q = 1.25 $\times 10^5$ J. $n = 40$ moles. $C_p = 20.8$ J/(mole-K).