The temperature and pressure in a high-performance spark ignition IC engine at the beginning of the intake stroke are 300 K and 1 atm. For reasons of emissions control and material limitations, the maximum temperature in the cycle must be limited to 2000 K. The specific heats of the air remain constant, with $c_v = 0.72$ kJ/kg K.

(a) Prepare a plot of the net work per unit mass, $w_{net}$, as a function of compression ratio $\epsilon$ for $\epsilon$ values ranging from 6 through 20. Your plot should show a maximum value of $w_{net}$ for $\epsilon$ around 15.

(b) Based on the results of your plot, calculate the minimum displacement of the engine, and the associated compression ratio, so that it will produce 150 kW of power at 800 RPM.