1. Not all quasistatic processes are reversible! Give an example of a process that illustrates this. (Would would a movie of it look right if played backwards?)

   1. Anything with friction.
   2. Gradual free expansion through a small hole. Many other!

Are all reversible processes quasistatic?

Yes!

2. The Carnot cycle is as follows. Take \( n \) moles of gas in a cylinder, and do the following to it, reversibly:

   Start at \( p_1, V_1, T_1 \).
   Expand isothermally to \( p_2, V_2, T_2 \).
   Expand adiabatically to \( p_3, V_3, T_3 \).
   Compress isothermally to \( p_4, V_4, T_4 \).
   Compress adiabatically back to \( p_1, V_1, T_1 \).

Sketch the Carnot cycle on a diagram of \( \ln P \) vs \( \ln V \), instead of the usual \( P \) vs \( V \). Show from this diagram that \( V_2/V_1 = V_3/V_4 \).

\[ \ln V_2 - \ln V_1 = \ln V_3 - \ln V_4 \]

so \( V_2/V_1 = V_3/V_4 \)