8. (10 points) The ideal gas law relates the volume and pressure of a gas to the temperature of the gas. The formula can be given as

$$PV = cT$$

where P is the pressure of the gas measured in *atmospheres*, V is the volume of the gas measured in *liters*, c is a positive constant, and T is the temperature of the gas measured in *kelvins*. (Remember, a temperature measured in kelvins is always positive!)

(a) If T is held constant, find $\frac{dV}{dP}$.

(b) What is the meaning of the sign of your answer to part (a)? Explain this in everyday terms.

(c) Suppose V, P, and T are all functions of the time t. Find $\frac{dT}{dt}$.