The accompanying plot below shows constant temperature $T$ (in Kelvin) level curves as given by the ideal gas law $pV = nRT$ with $n = 0.15 \text{ mol}$ and $R = 0.082 \text{ L·atm/(mol·K)}$.

1. Estimate the rate of change in temperature $T$ with respect to change in volume $V$ for $V = 0.2 \text{ L}$ and $p = 0.2 \text{ atmospheres}$.

2. Estimate the rate of change in temperature $T$ with respect to change in pressure $p$ for $V = 0.2 \text{ L}$ and $p = 0.2 \text{ atmospheres}$.

3. Repeat Steps 1 and 2 for each of the following $(V, p)$ pairs.
   
   (a) $(0.2 \text{ L}, 0.4 \text{ atm})$  (b) $(0.2 \text{ L}, 0.6 \text{ atm})$  (c) $(0.2 \text{ L}, 0.8 \text{ atm})$
   
   (d) $(0.4 \text{ L}, 0.2 \text{ atm})$  (e) $(0.6 \text{ L}, 0.2 \text{ atm})$  (f) $(0.8 \text{ L}, 0.2 \text{ atm})$

4. Use your previous results to make a plot showing rate of change in temperature $T$ with respect to volume $V$ versus pressure $p$ for $V = 0.2 \text{ L}$.

5. Use your previous results to make a plot showing rate of change in temperature $T$ with respect to volume $V$ versus volume $V$ for $p = 0.2 \text{ atm}$.

6. Use your previous results to make a plot showing rate of change in temperature $T$ with respect to pressure $p$ versus pressure $p$ for $V = 0.2 \text{ L}$.

7. Use your previous results to make a plot showing rate of change in temperature $T$ with respect to pressure $p$ versus volume $V$ for $p = 0.2 \text{ atm}$.