Estimating rate of change

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

1. Use information from the plot to estimate the rate of change in temperature T with respect to change in volume V for $V = 0.2$ L and $p = 0.2$ atmospheres.

2. Use information from the plot to estimate the rate of change in temperature T with respect to change in pressure p for $V = 0.2$ L and $p = 0.2$ 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) $(0.2 \text{ L}, 0.8 \text{ atm})$

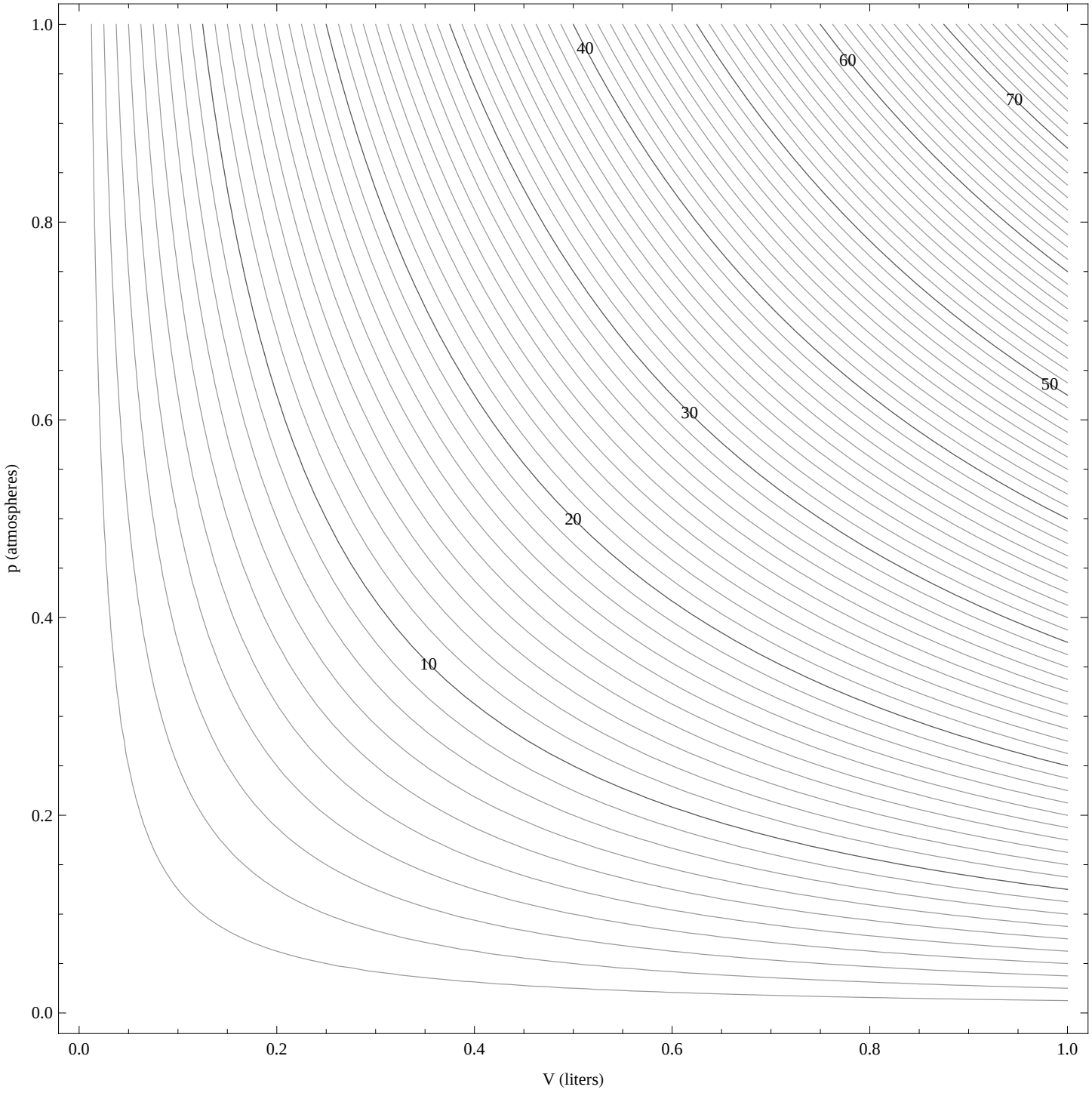
   (d) $(0.4 \text{ L}, 0.2 \text{ atm})$ (e) $(0.6 \text{ L}, 0.2 \text{ atm})$ (f) $(0.8 \text{ L}, 0.2 \text{ atm})$

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 $V = 0.2$ 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 $p = 0.2$ 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 $V = 0.2$ 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 $p = 0.2$ atm.


1.0
0.8
0.6
0.4
0.2
0.0
p (atmospheres)
0.0
0.2
0.4
0.6
0.8
1.0
V (liters)
10
20
30
40
50
60
70