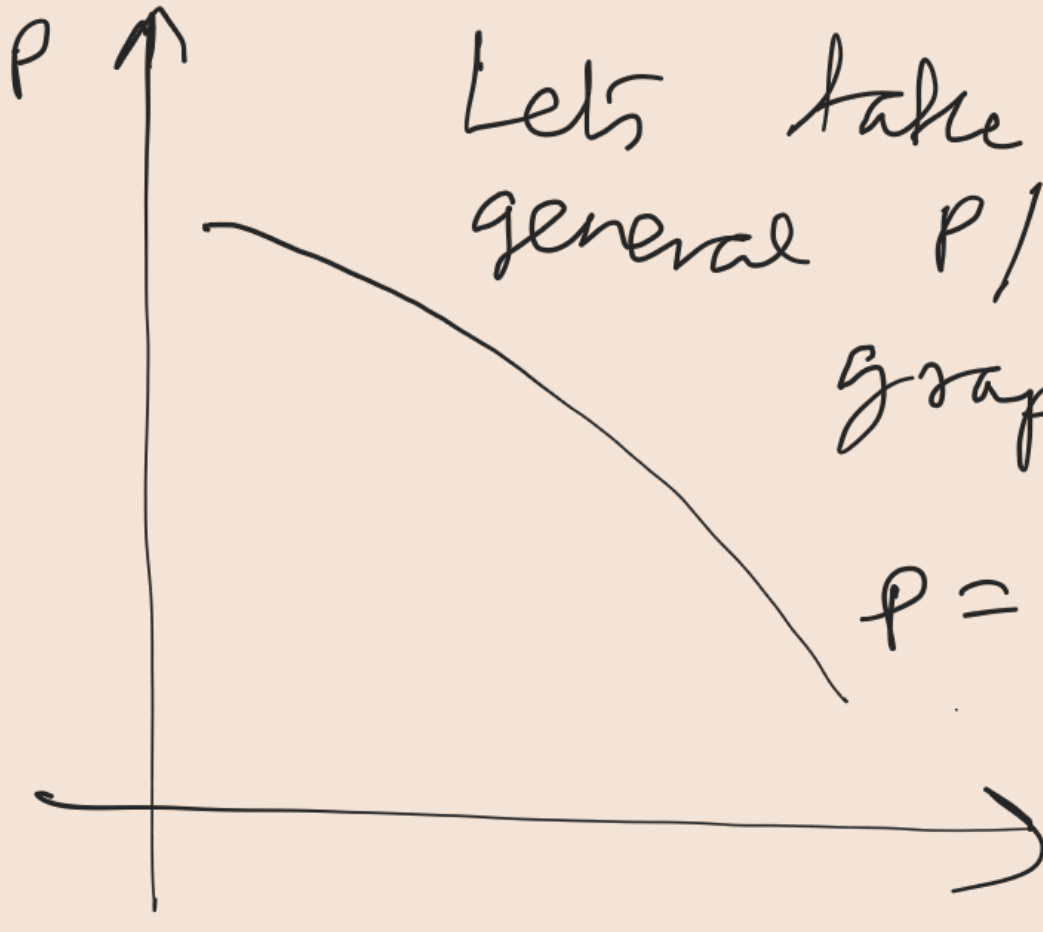
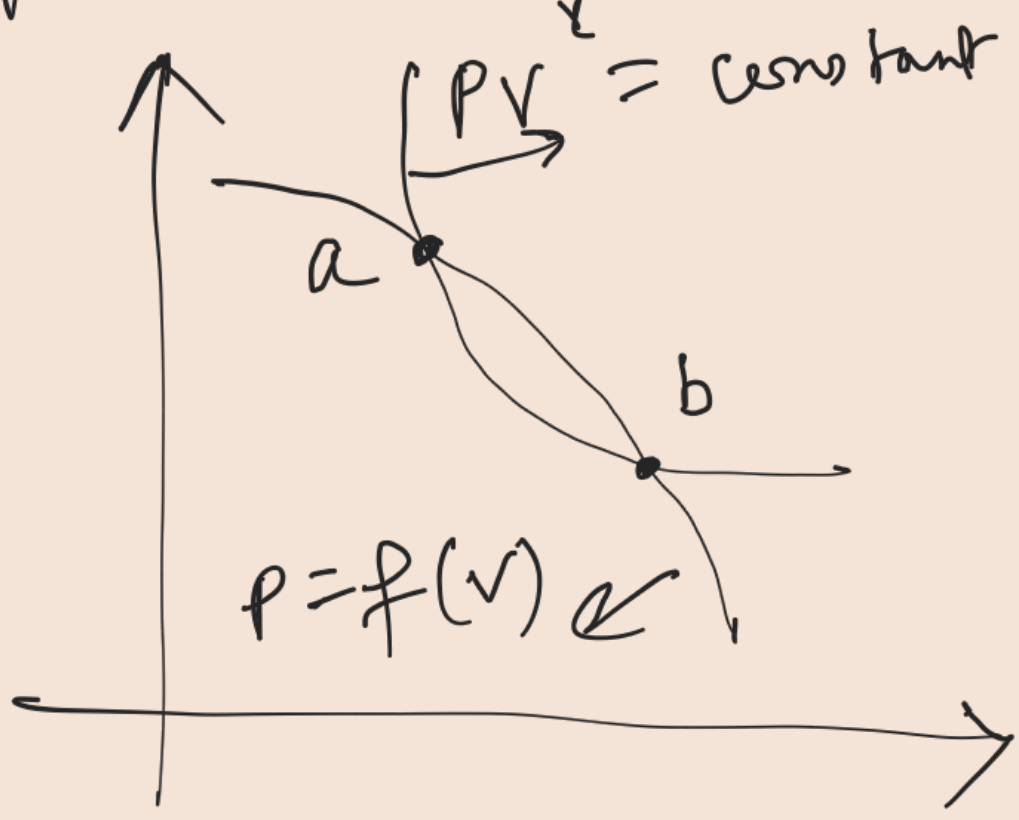


Let's take a general P/V functional graph.

$P = f(V)$

P, V & T are state variables, meaning they depend only on a particular point on the graph. However, 'dQ' or infinitesimal heat exchange of gas depends on an infinitesimal

'section' of the P/V graph rather than a particular point on it.



In this figure, at the points 'a' & 'b', the values of 'p' & 'V' are such that they simultaneously satisfy $p = f(V)$ & $PV^{\gamma} = k$.

However, an adiabat is such that if we

take an infinitesimal section of it, then the curvature is so adjusted that 'dQ' becomes zero. Hence, for any general $P = f(V)$, the process of exo-endo interchange must be where the tangent to $P = f(V)$ & the adiabat become common. (Rest of the problem is standard.)