Lecture 14

- HW #5 graded!

Exam #1

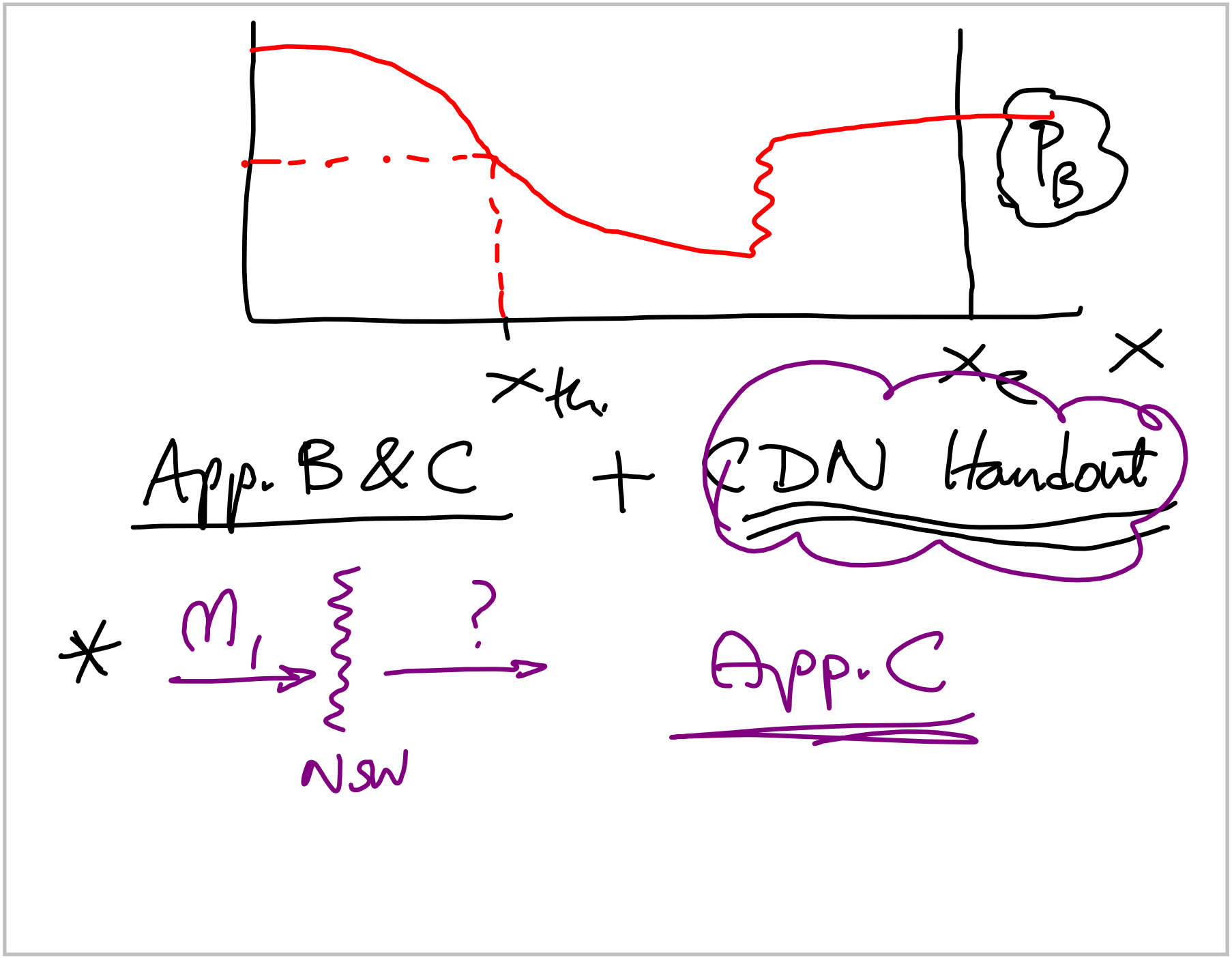
Th. (Oct. 4)

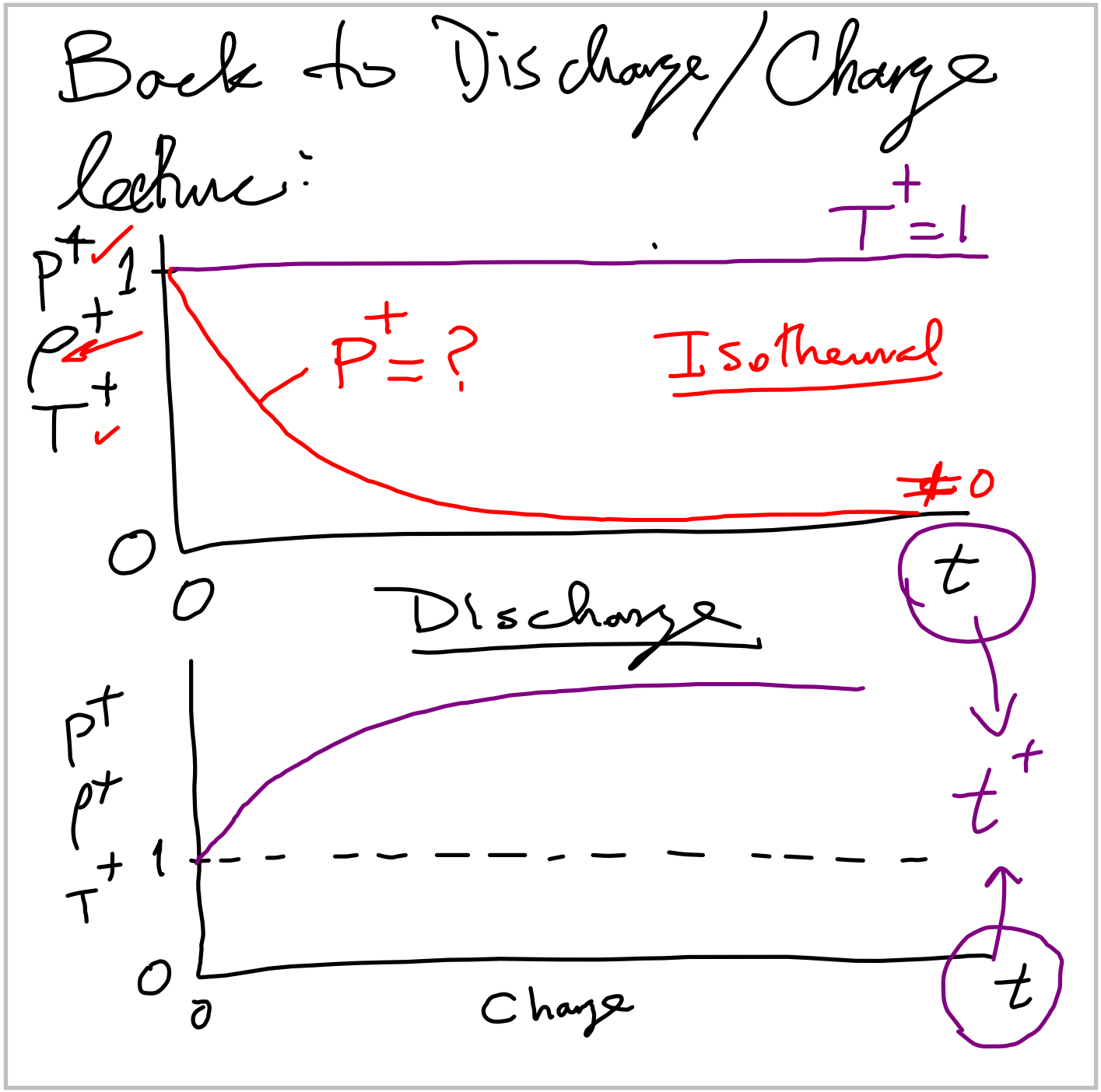
→ 60 minutes long!

3 problems

* CN problem
  (No shock waves)

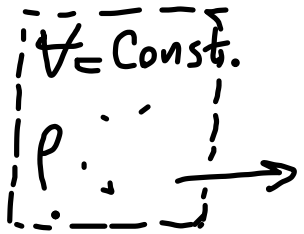
* CDN problem


P_B
x_{th}
x
App. B & C
+
CDN Handout
*
m_1
?
NSW
App. C

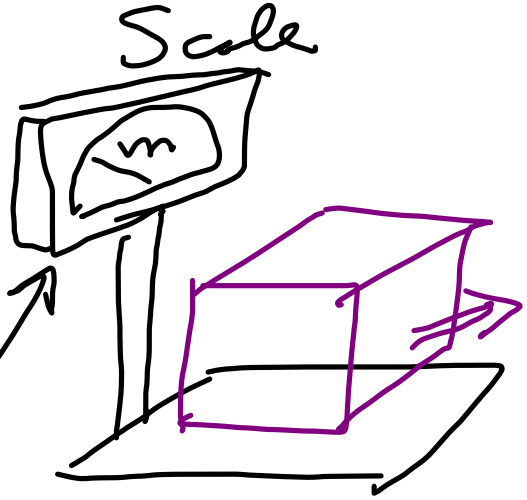

Back to Discharge/Charge
lecture:
$T^+ = 1$
p^+ ✓
1
ρ^+
T^+ ✓
$P^+ = ?$
Isothermal
$\neq 0$
0
0
t
Discharge
p^+
ρ^+
T^+
1
t^+
0
0
Charge
t

Continuity:

$$\frac{\partial}{\partial t}\int_{CV}\rho\,d\forall + \oint_{CS}\rho\,\bar{V}\cdot d\bar{A} = 0$$

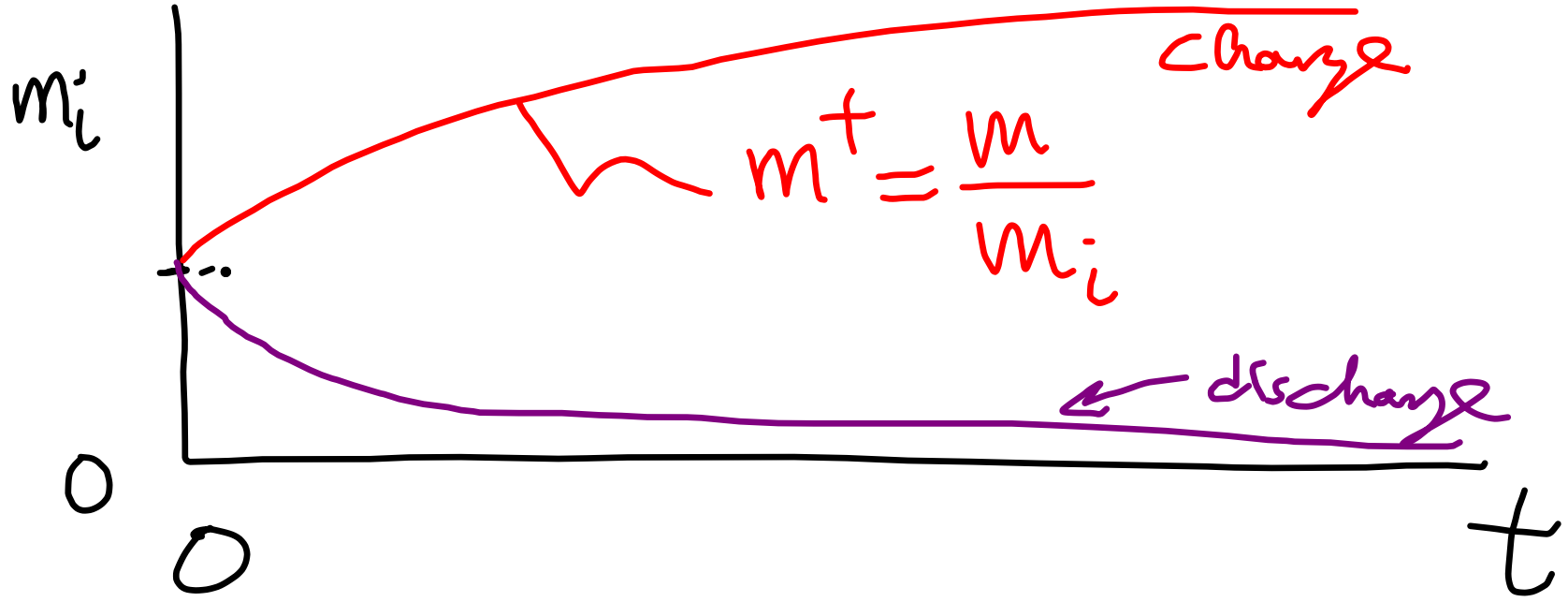


$$\frac{\partial}{\partial t}\int_{CV}\rho\,d\forall$$



Density is treated to be uniform

$$\frac{\partial}{\partial t}\left(\rho\int d\forall\right) \equiv \begin{cases} >0 & \text{Charge} \\ 0 \Rightarrow & \\ <0 & \text{Discharge} \end{cases}$$



$$\frac{\partial}{\partial t}\left[\rho \int_{cv} d\forall\right] = \frac{\partial}{\partial t}(\rho \forall)$$

Here: $\forall = \text{const.} = \forall \frac{\partial \rho}{\partial t}$.

If $\forall$ was not const.

$$\frac{\partial}{\partial t}(\rho \forall) = \forall \frac{\partial \rho}{\partial t} + \underbrace{\rho \frac{\partial \forall}{\partial t}}$$

Class problem!