Physics 142 – October 14, 2008

- Exam 1 graded
  will hand back and discuss at end of class

- Are you able to see P142 grades in BlackBoard?

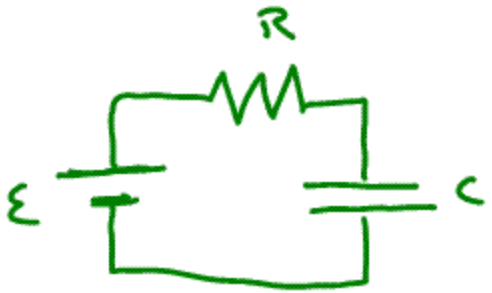
- Exam Regrade/question Policy

- Hand in Presentation Preference forms today

Last Time -

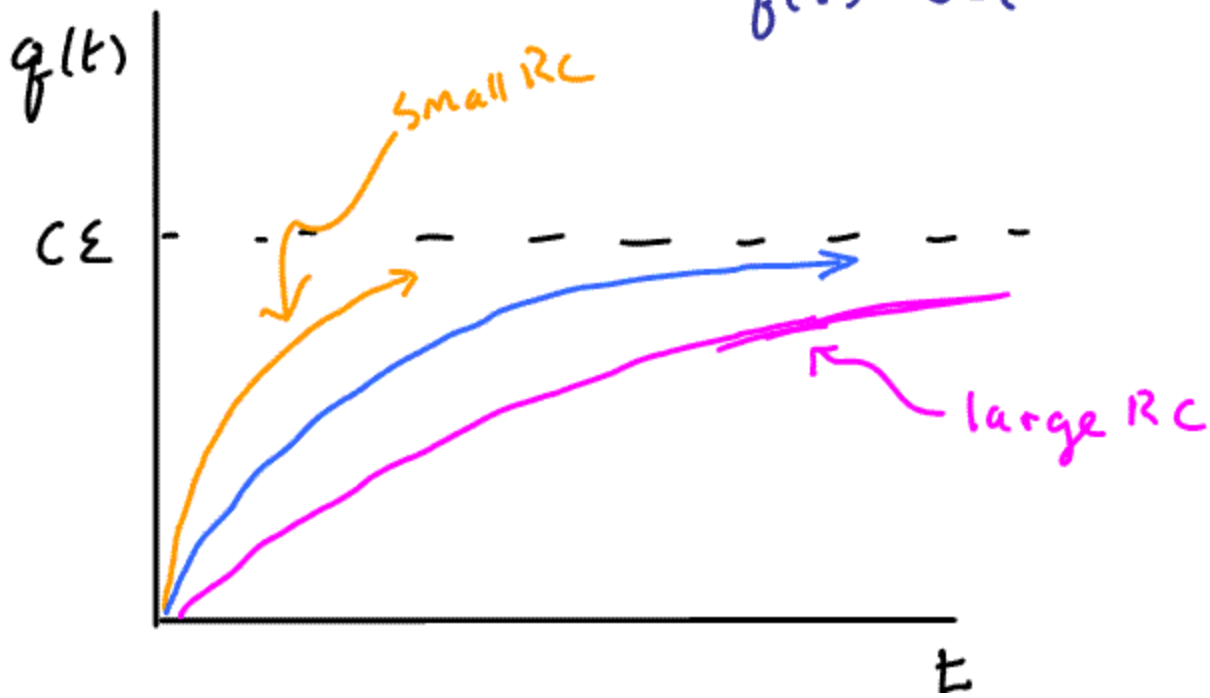
RC circuits

RC ≡ time constant



Charging

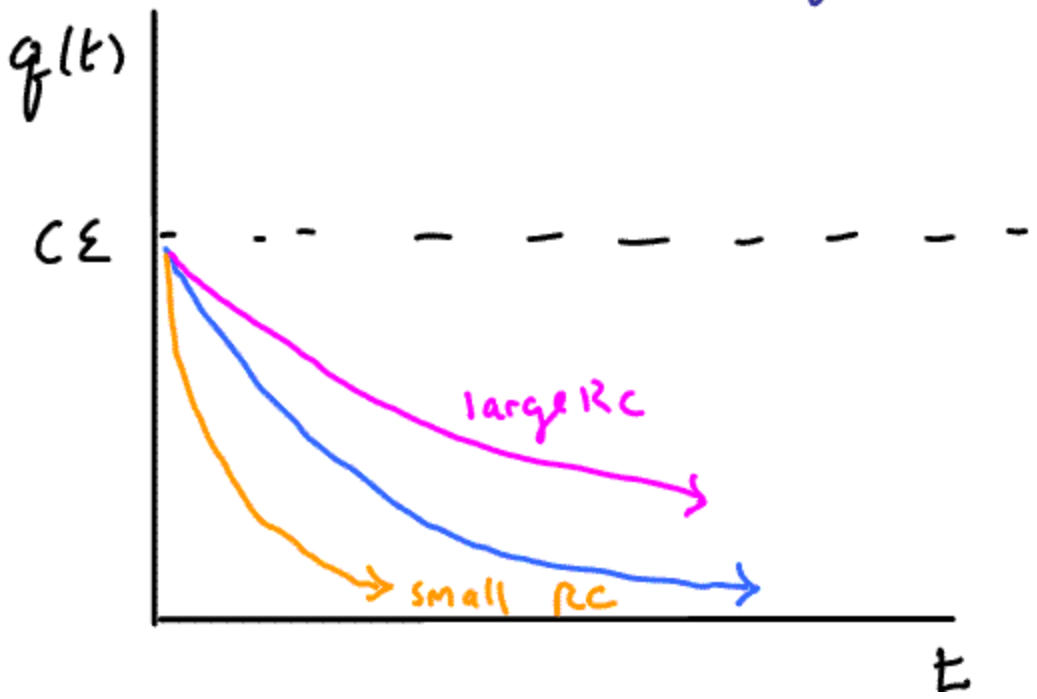
$$q(t) = C\varepsilon\left(1 - e^{-t/RC}\right)$$



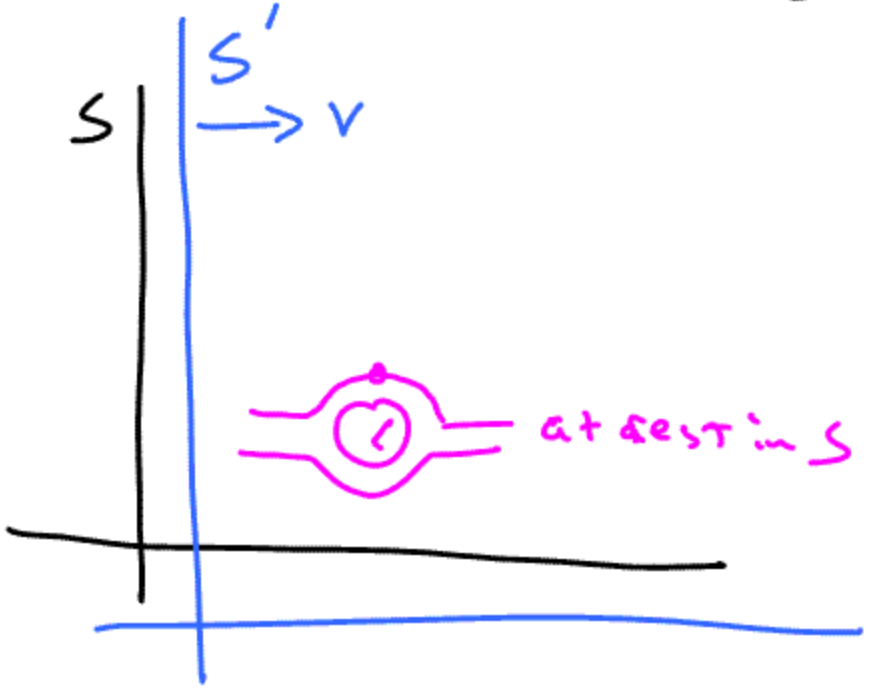
discharging

$C\mathcal{E}$ or CV if given charging info

$$q(t) = \hat{q}_0 e^{-t/RC}$$



Special Theory of Relativity



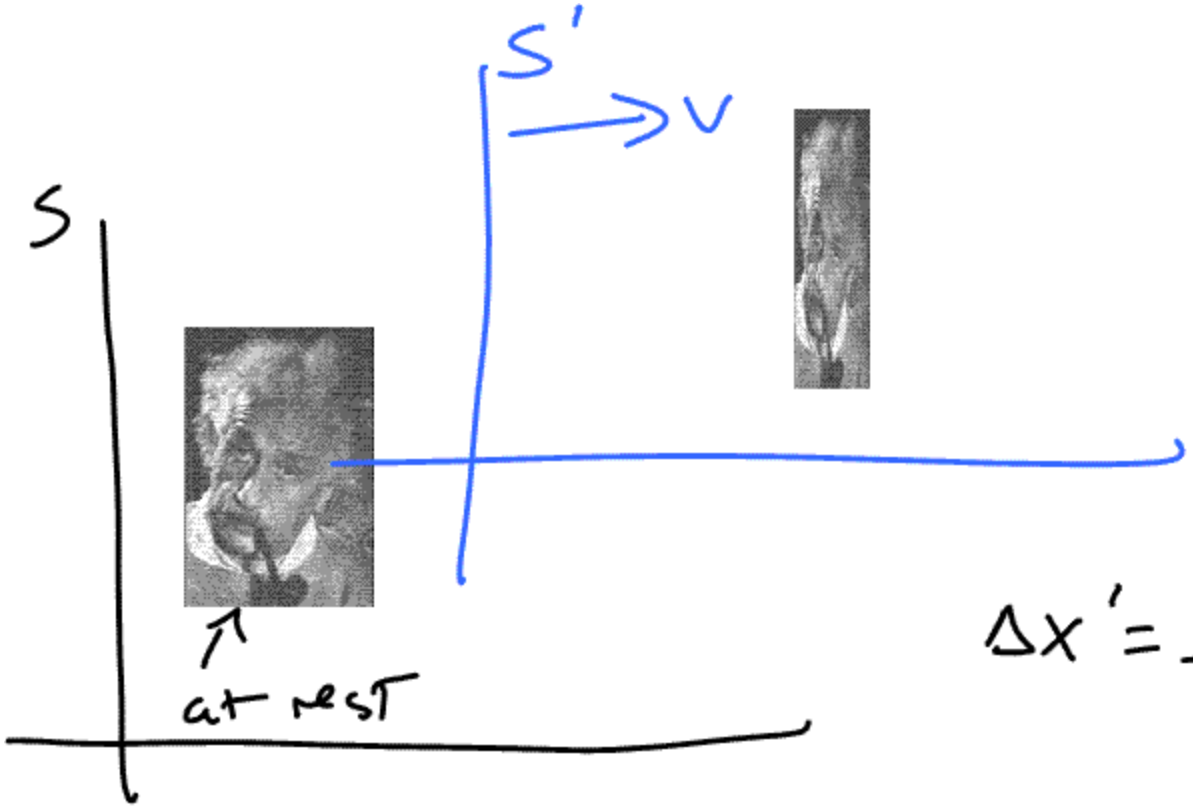
S is proper frame
event at rest

$$\Delta t' = \gamma \Delta t$$

$$\gamma = \frac{1}{\sqrt{1 - \left(\frac{v}{c}\right)^2}}$$

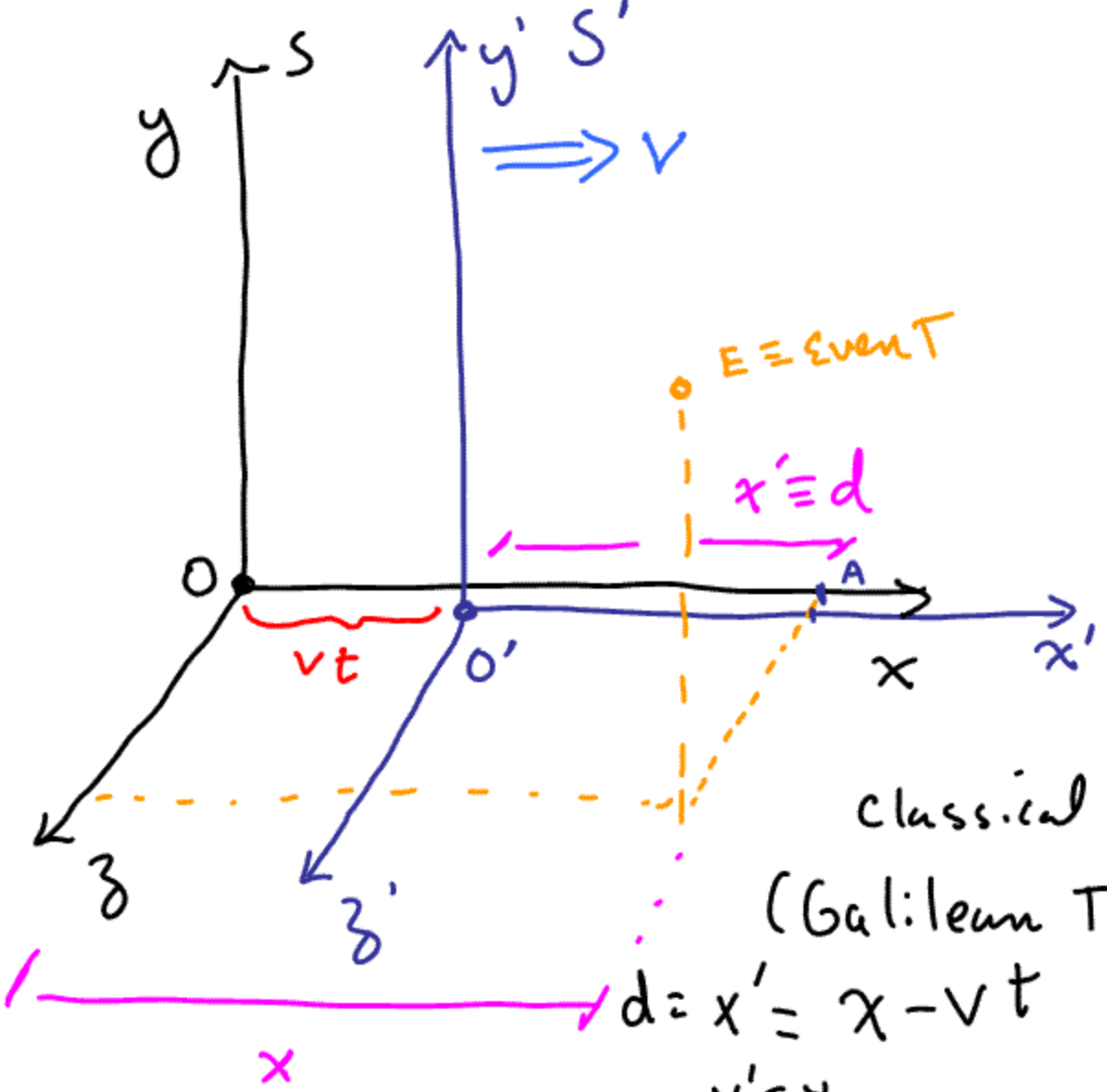
> 1

measured time is shortest in proper frame where event at rest



$$\Delta x' = \frac{\Delta x}{\gamma}$$

Length is greatest in proper frame of reference



at $t=0, t'=0$

two systems overlap

$O = O'$

classical physics

(Galilean Transformations)

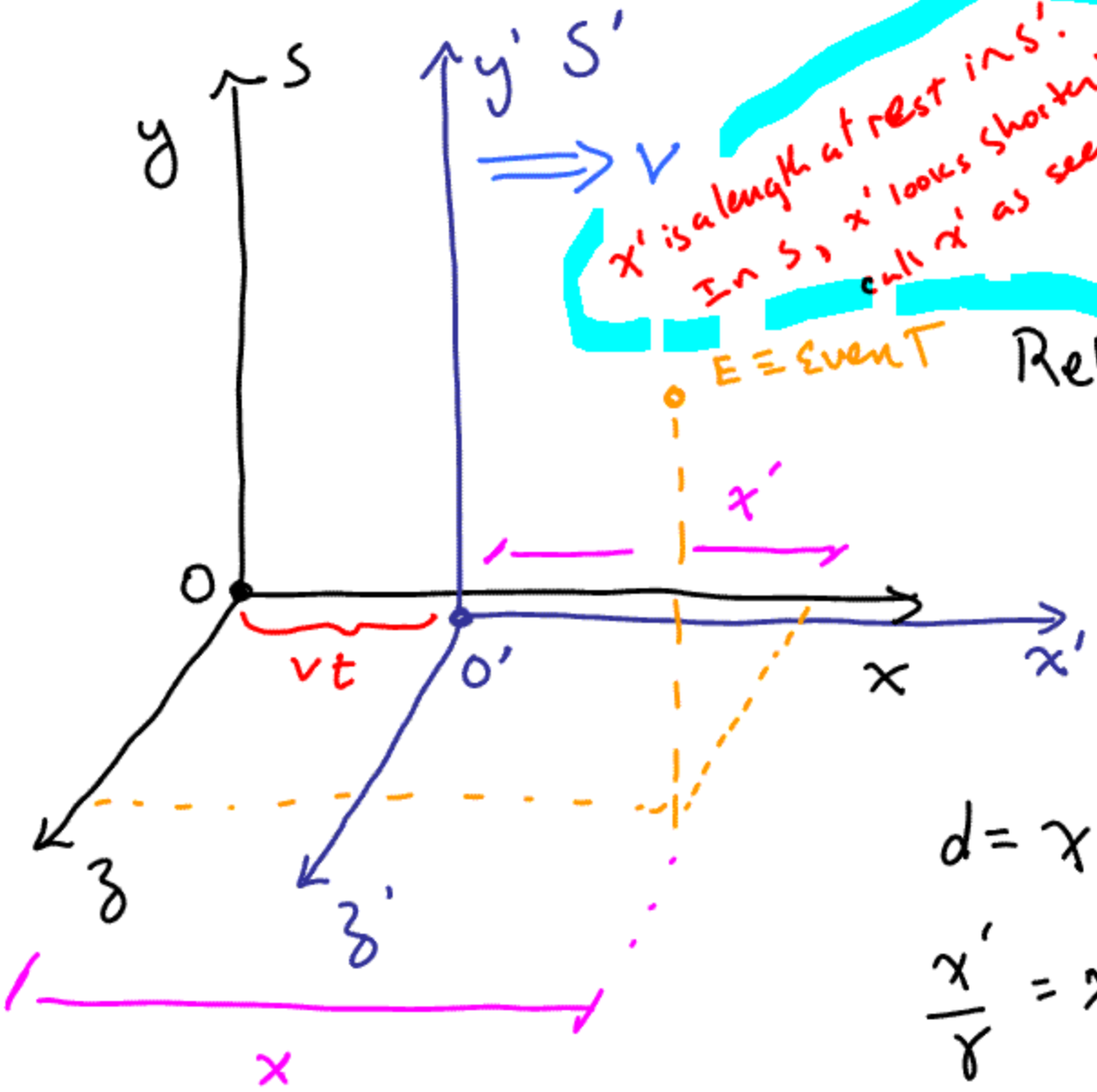
$d = x' = x - vt$

$y' = y$

$z' = z$

$t' = t$

d is x' as seen in S



x' is a length at rest in S'.
In S, x' looks shortened by $\frac{1}{\gamma}$
call x' as seen in S → d
$d = x'/\gamma$

This is reasoning I didn't recall in class

E = EVENT

Relativistic TRANSformations

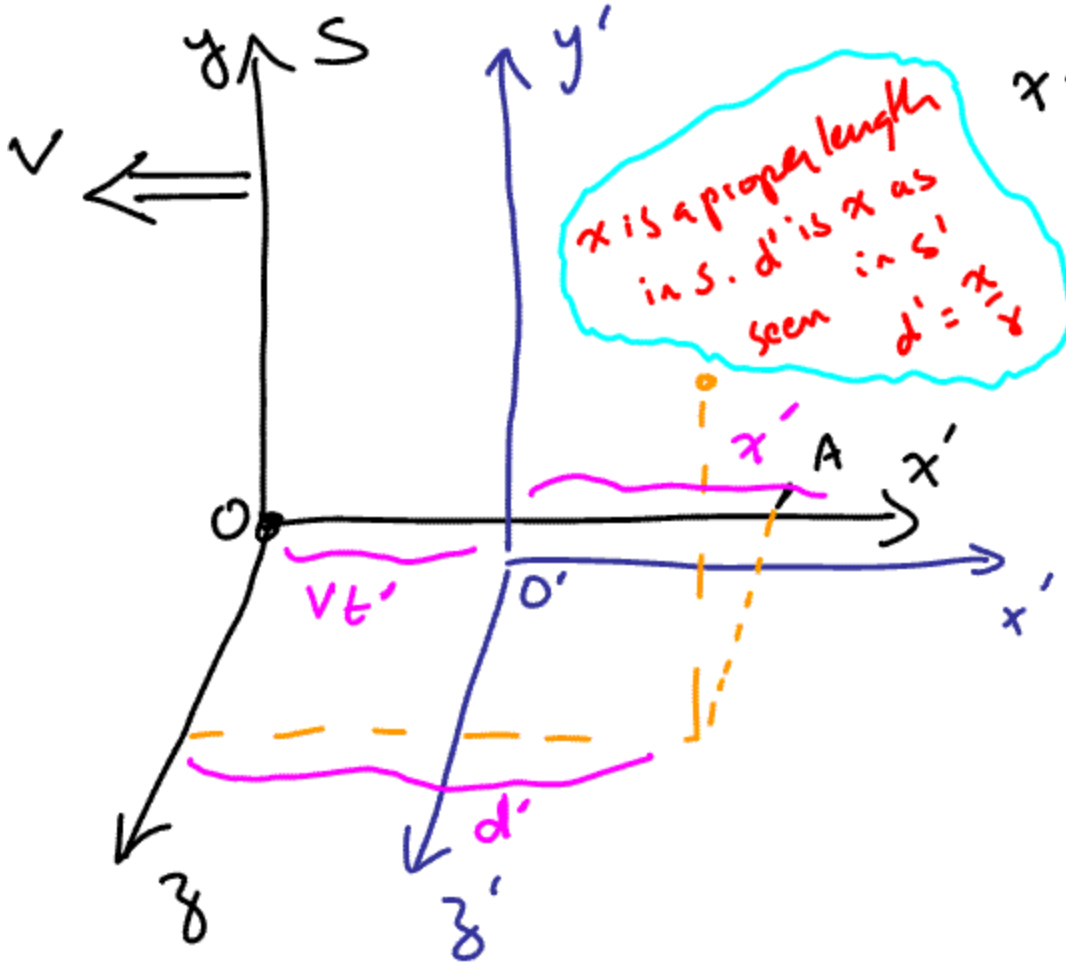
$$d = \frac{x'}{\gamma}$$

$$x' = d\gamma$$

$$d = x - vt$$

$$\frac{x'}{\gamma} = x - vt$$

$$x' = \gamma(x - vt)$$



x = dist from O to A in S

$$d' = \frac{x}{\gamma}$$

$$x' = d' - vt'$$

$$x' = \frac{x}{\gamma} - vt'$$

$$x = \gamma(x' + vt')$$

$$x = \gamma(x' + vt') \qquad x' = \gamma(x - vt)$$

substitute in

$$x = \gamma\left(\gamma(x - vt) + vt'\right)$$

bit of Algebra

$$t = \gamma\left(t' + \frac{v}{c^2}x'\right) \qquad t' = \gamma\left(t - \frac{v}{c^2}x\right)$$