

11 September 2025 - ongoing SR review

Autosave disabled

Reminders

Proper length L_0

The length of an object in its own frame of reference.

Proper time τ

The time seen by an observer who is present at both events.

Lorentz Transform

v is the velocity of the primed frame along the unprimed frame's x axis.

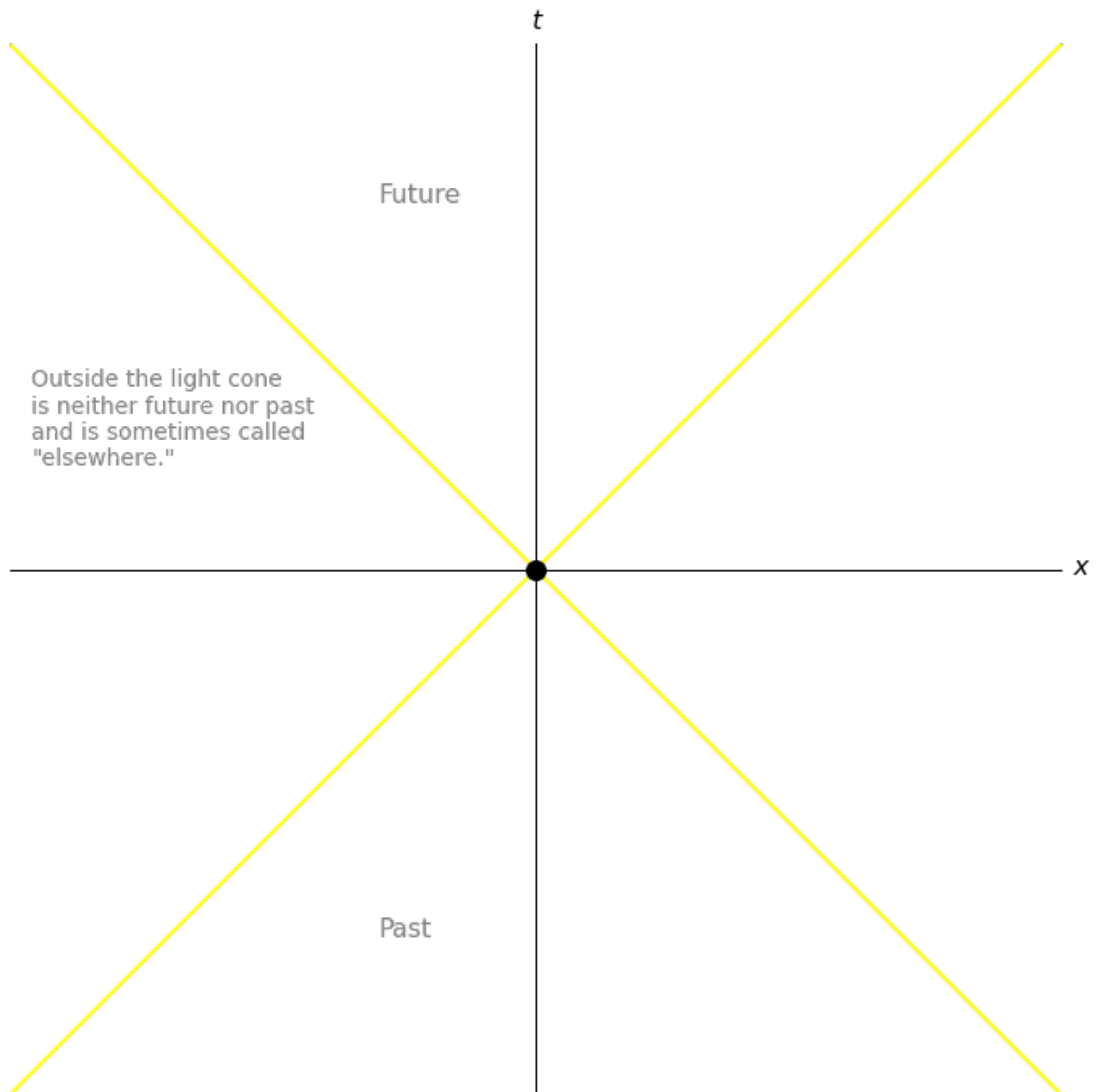
We're using the same units for space and time.

$$\gamma = \frac{1}{\sqrt{1 - v^2}}$$

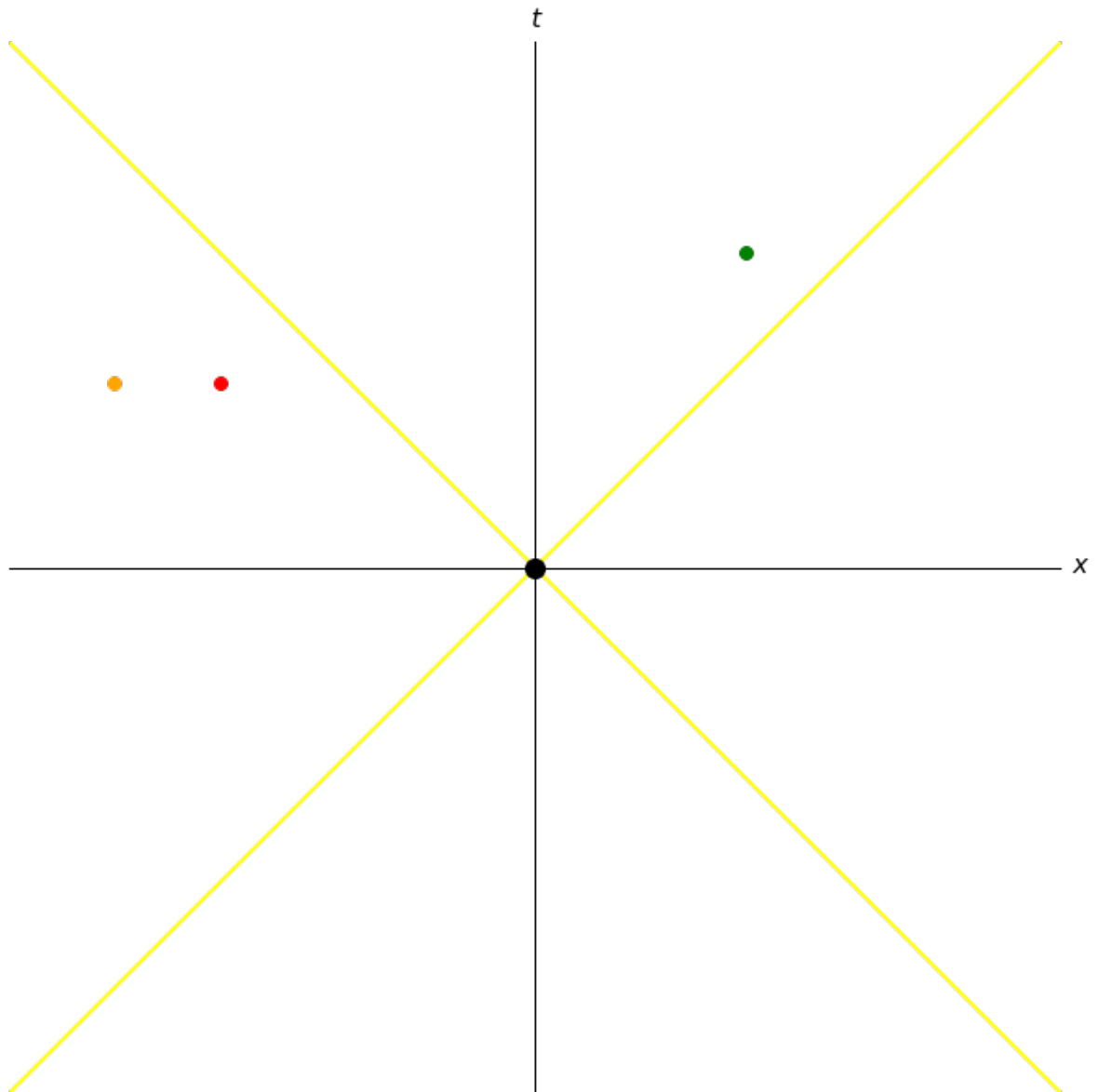
$$x' = \gamma(x - vt)$$

$$t' = \gamma(t - vx)$$

The Light Cone

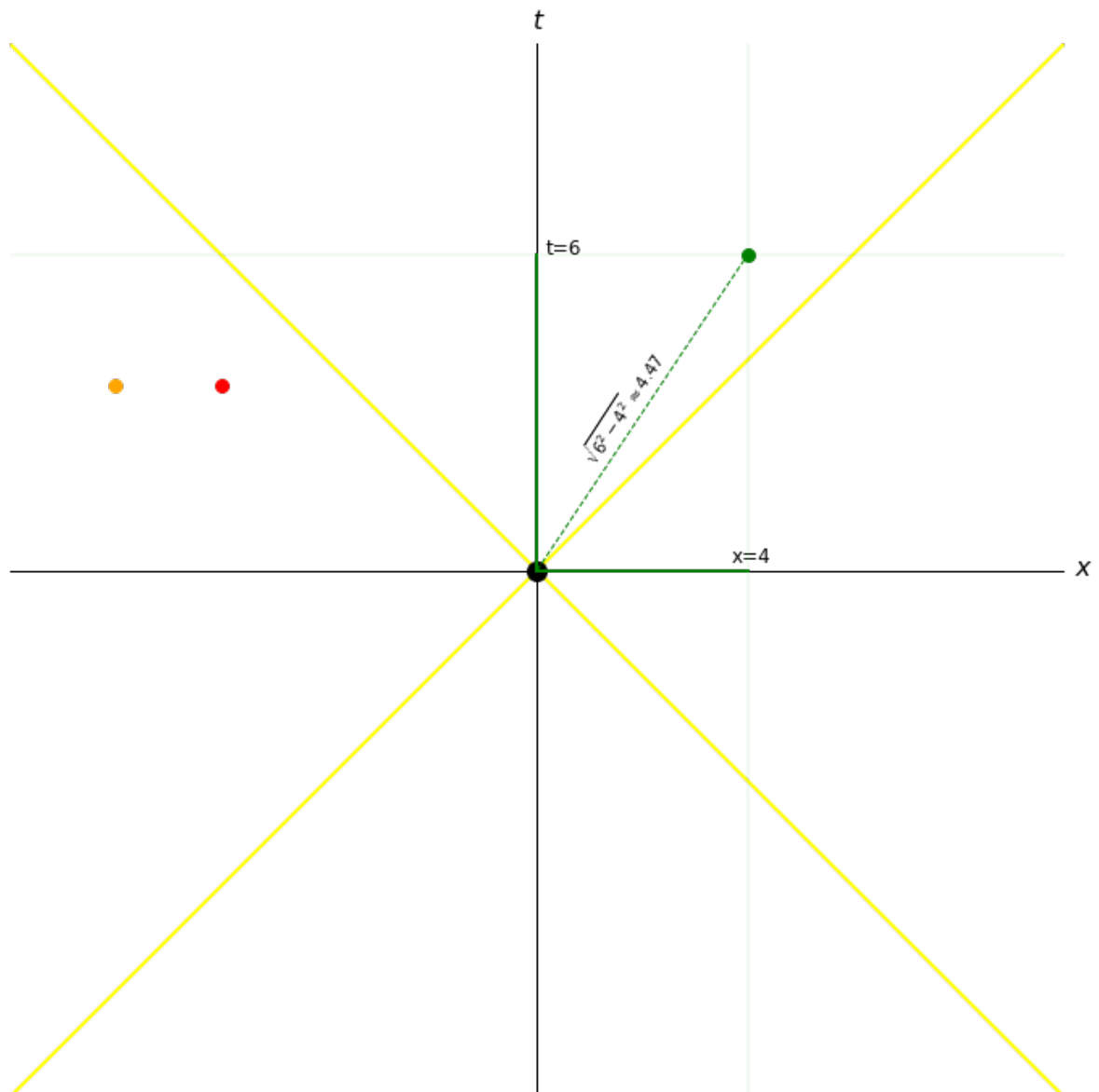


Add some events

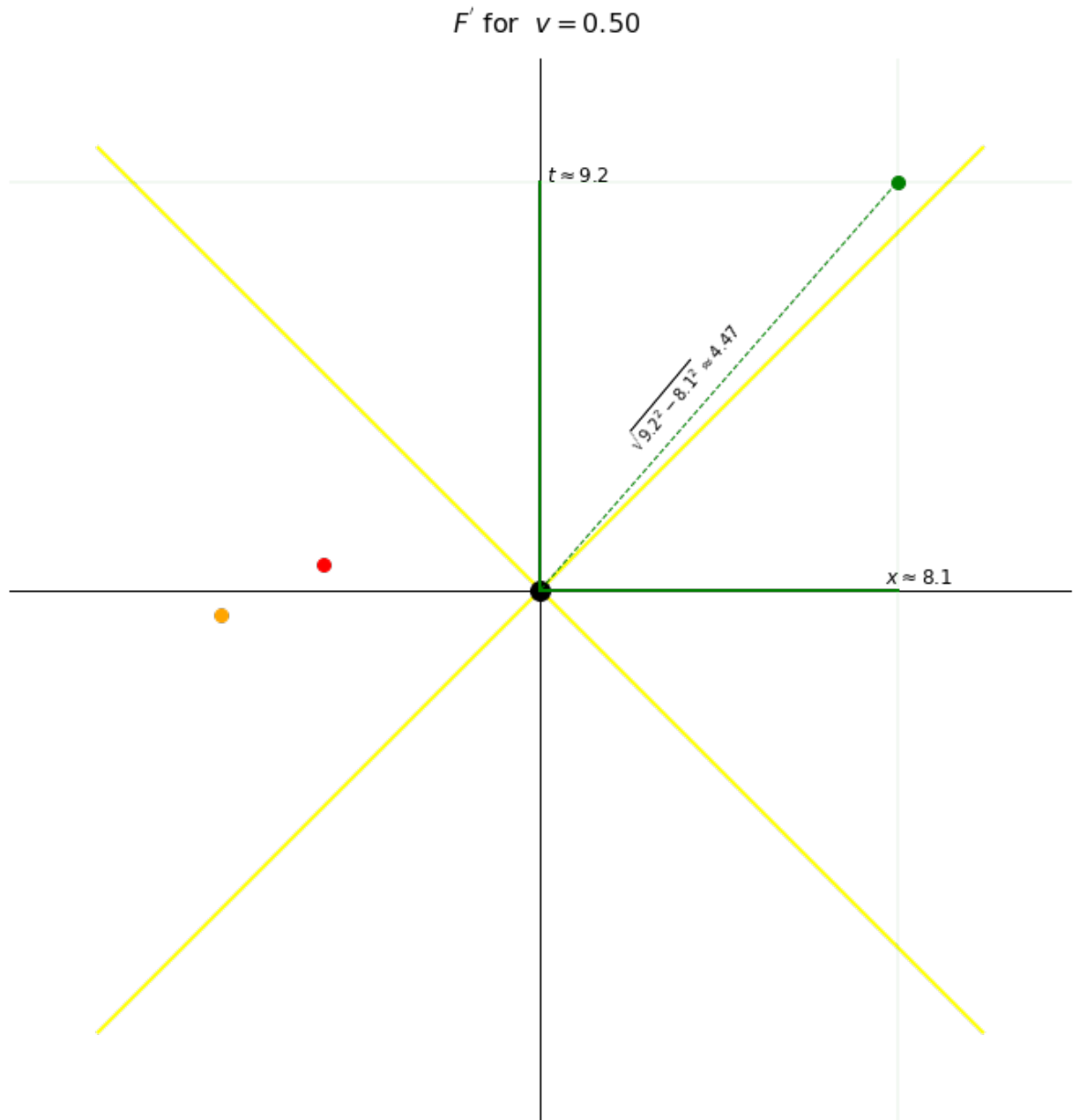


The Spacetime Interval

- Time-like: $\sqrt{T^2 - X^2}$, space-like: $\sqrt{X^2 - T^2}$, and null (light cone) intervals.
- $d\tau^2 = dt^2 - dx^2 - dy^2 - dz^2$
- $ds^2 = -dt^2 + dx^2 + dy^2 + dz^2$
- This is the invariant thing. The analogue of a vector's length.
- You don't see its correct length on a spacetime diagram!



Primed Frame



Relativity of Simultaneity

