# relativity.sty
# Relativistic calculations and plots for LaTeX2ε

**Unit Tests**

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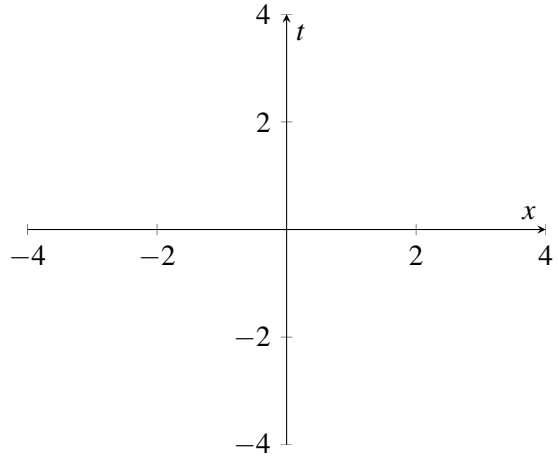
# Contents

# 1 Calculations

# 2 Plots

## 2.1 Empty plot with default options: \begin{spacetimediagram}...\end{...}



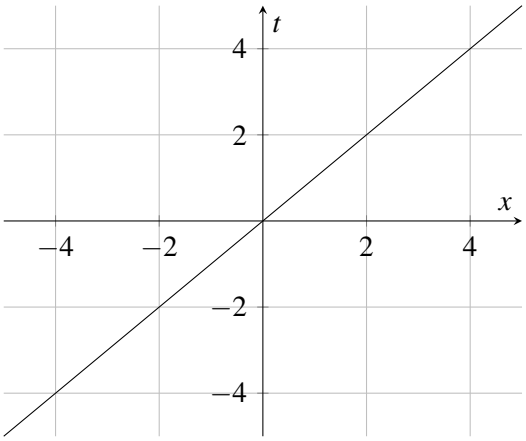

spacetimediagramdefaults:
axis x line=middle, axis y line=middle, xlabel=$x$, ylabel=$t$

### Pass Criteria

- Empty plot
- Axes in the middle
- Axes $x = -4..4$, $t = -4..4$

## 2.2 Light-like worldlines: \lightlike[style][x_shift=0][t_shift=0]{speed}

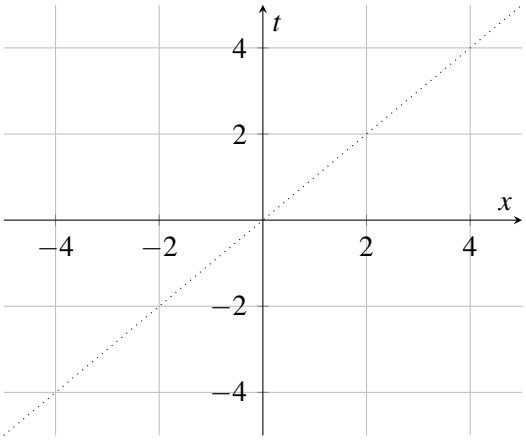
### 2.2.1 without options: \lightlike




**Pass Criteria**

- Non-empty plot
- Axes in the middle
- Straight, black, solid, thin line through origin at 45°

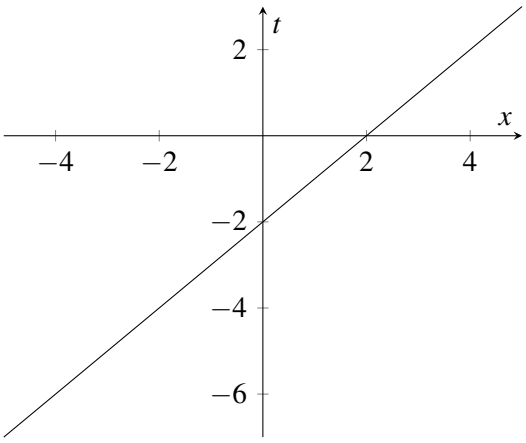
### 2.2.2 with PGFPlots style option: \lightlike[dotted]




**Pass Criteria**

- Non-empty plot
- Axes in the middle
- Straight, black, dotted, thin line through $(0, 0)$ at 45°

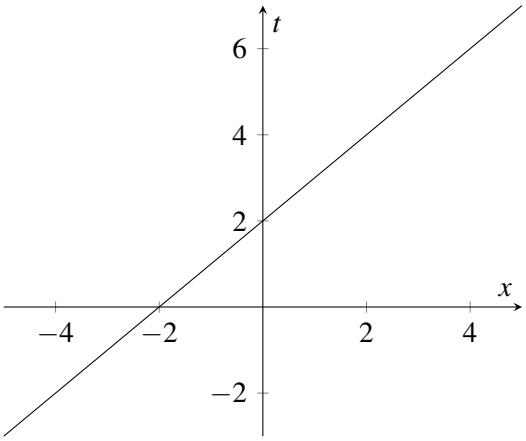
### 2.2.3 Positive shift in the $x$-direction: \lightlike[][2]



**Pass Criteria**

- Non-empty plot
- Axes in the middle
- Straight, black, solid, thin line through $(2, 0)$ at 45°

### 2.2.4 Negative shift in the $x$-direction: \lightlike[][-2]

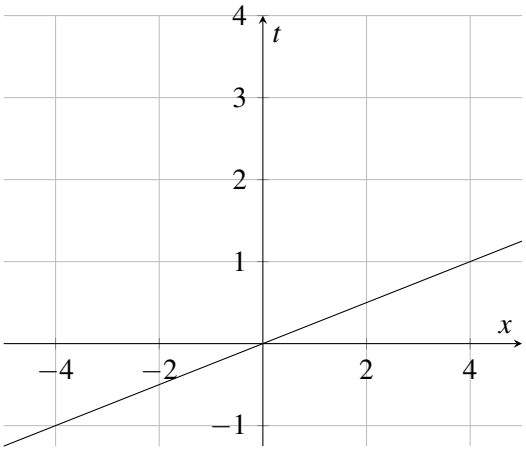



**Pass Criteria**

- Non-empty plot
- Axes in the middle
- Straight, black, solid, thin line through $(-2, 0)$ at 45°

## 2.3 Lines of simultaneity: \spatial[style][time][x_shift=0][t_shift=0]{speed}

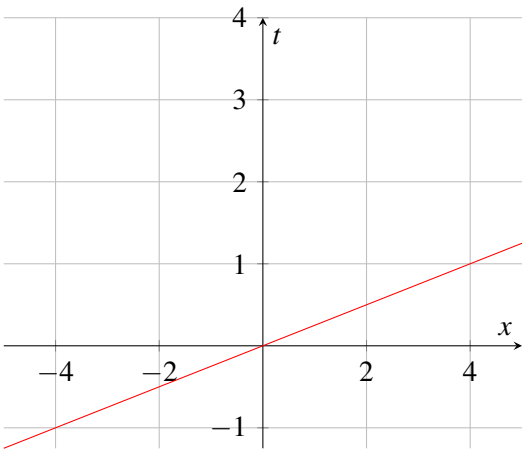
### 2.3.1 Non-zero speed: \spatial{0.25}




**Pass Criteria**

- Non-empty plot
- Axes in the middle
- Straight, black, solid, thin line through $(0, 0)$ and $(4, 1)$

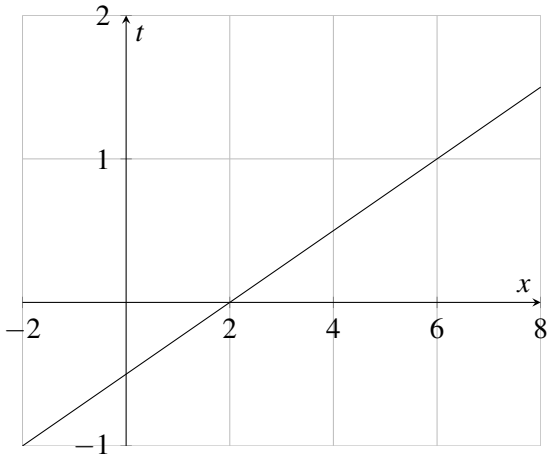
### 2.3.2 with PGFPlots style option: \spatial[red]{0.25}




**Pass Criteria**

- Non-empty plot
- Axes in the middle
- Straight, red, solid, thin line through $(0, 0)$ and $(4, 1)$

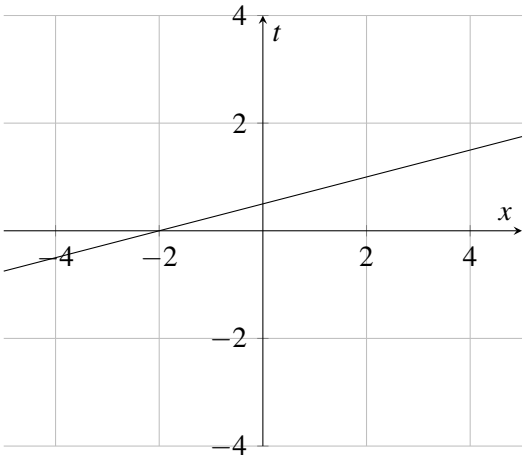
### 2.3.3 Positive shift in the $x$-direction: \spatial[][0][2]{0.25}



**Pass Criteria**

- Non-empty plot
- Axes in the middle
- Straight, black, solid, thin line through $(2, 0)$ and $(6, 1)$

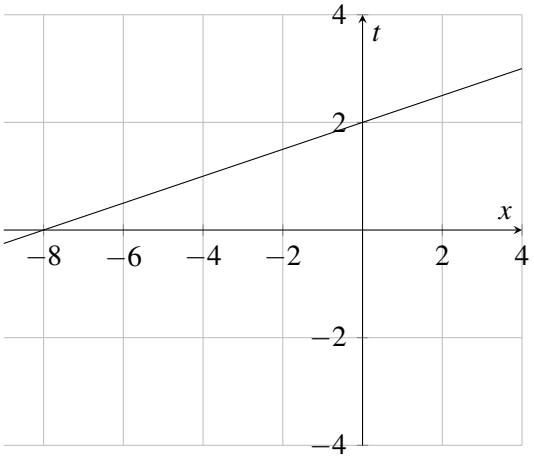
### 2.3.4 Negative shift in the $x$-direction: \spatial[][0][-2]{0.25}




**Pass Criteria**

- Non-empty plot
- Axes in the middle
- Straight, black, solid, thin line through $(-2, 0)$ and $(2, 1)$

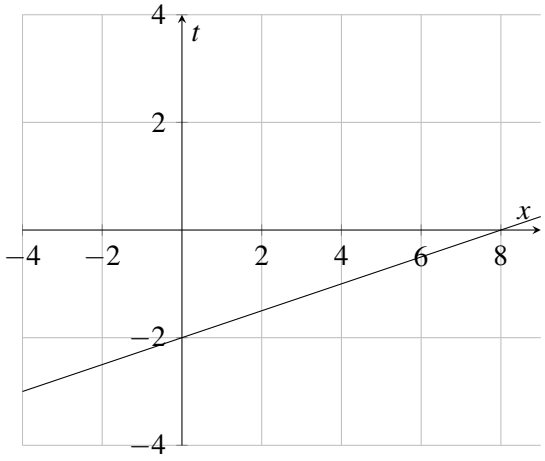
### 2.3.5 Positive shift in the $t$-direction: \spatial[][0][0][2]{0.25}




**Pass Criteria**

- Non-empty plot
- Axes in the middle
- Straight, black, solid, thin line through $(-8, 0)$ and $(0, 2)$

### 2.3.6 Negative shift in the $t$-direction: $\backslash\mathrm{spatial}[][0][0][-2]\{0.25\}$

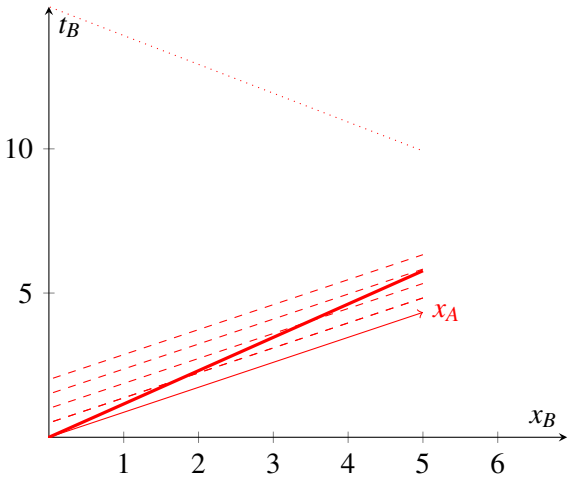



**Pass Criteria**

- Non-empty plot
- Axes in the middle
- Straight, black, solid, thin line through $(0, -2)$ and $(8, 0)$

# 3 Full Demo

$v = 0.866\,025\,403\,784\,438\,637\,\mathrm{c}$
$(x_A = 0, t_A = 4) \equiv (x_B = 6.928203230275508777, t_B = 7.999999999999999632)$


$t_B$
10
5
$x_A$
$x_B$
1
2
3
4
5
6