

# Lecture 2

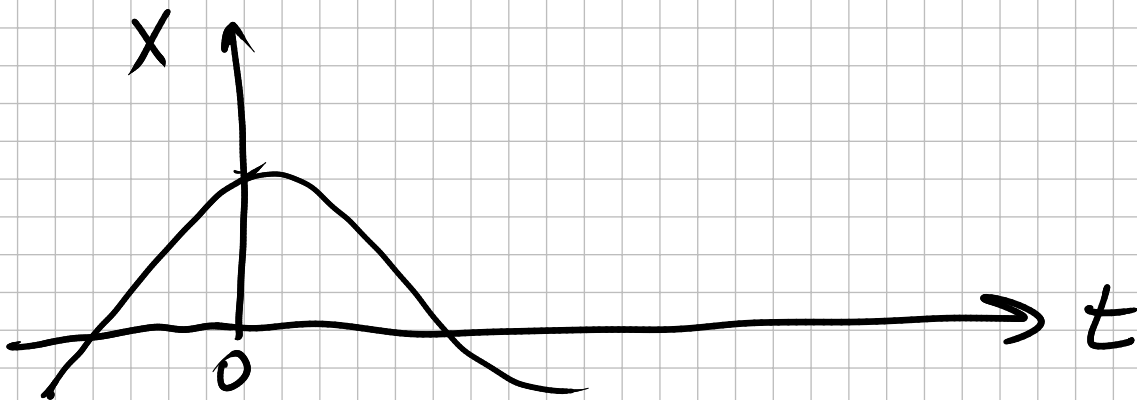
## Kinematics

Position — reference point  
aka origin



Position has sign — displacement

Distance — has no sign



Position time

$x_1, t_1$

$x_2, t_2$

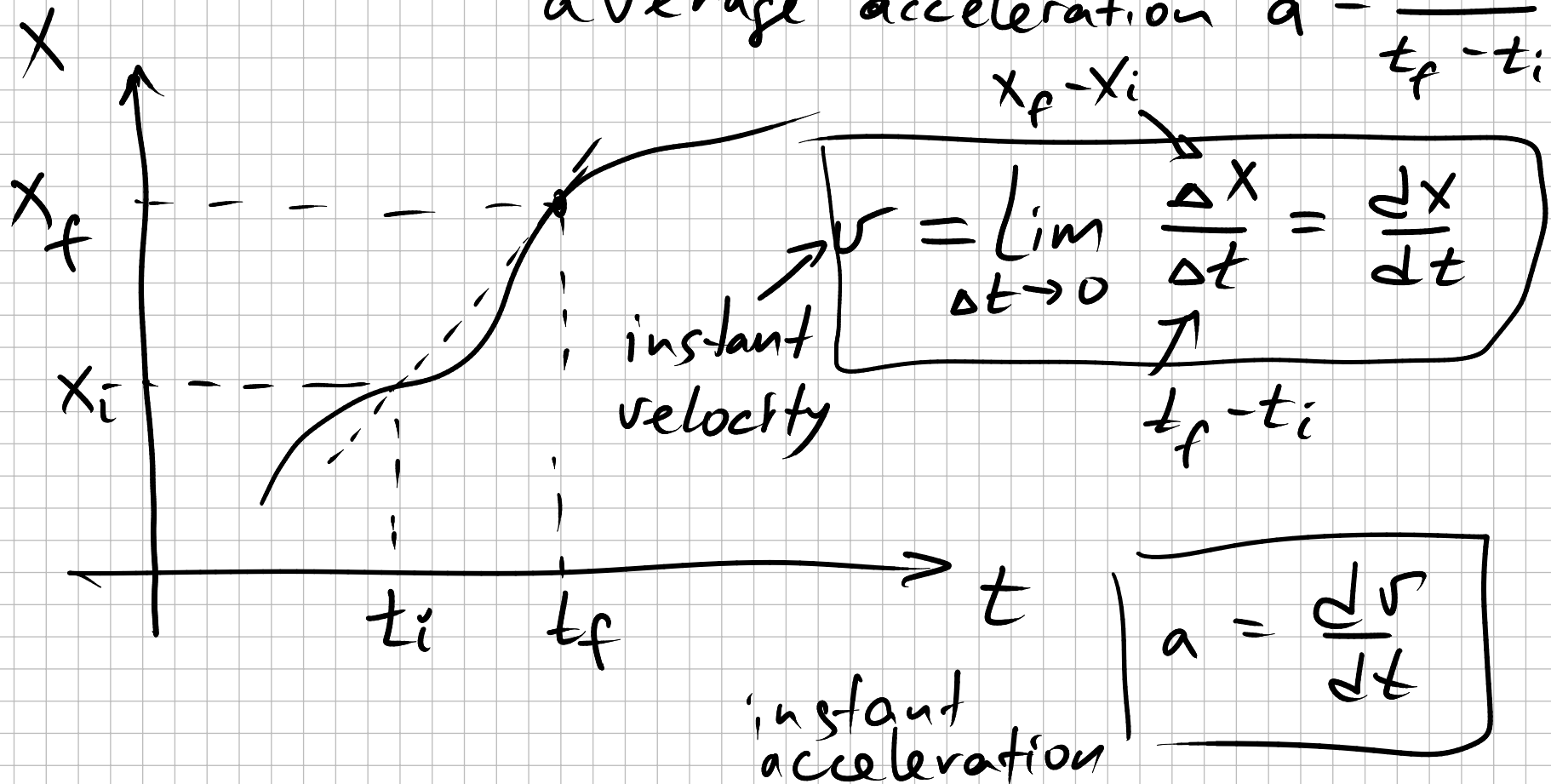
$x_3, t_3$

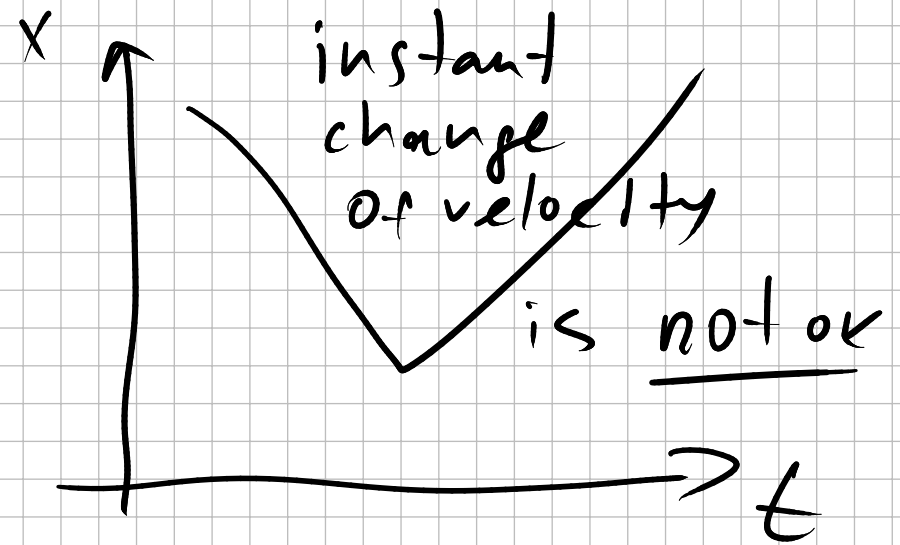
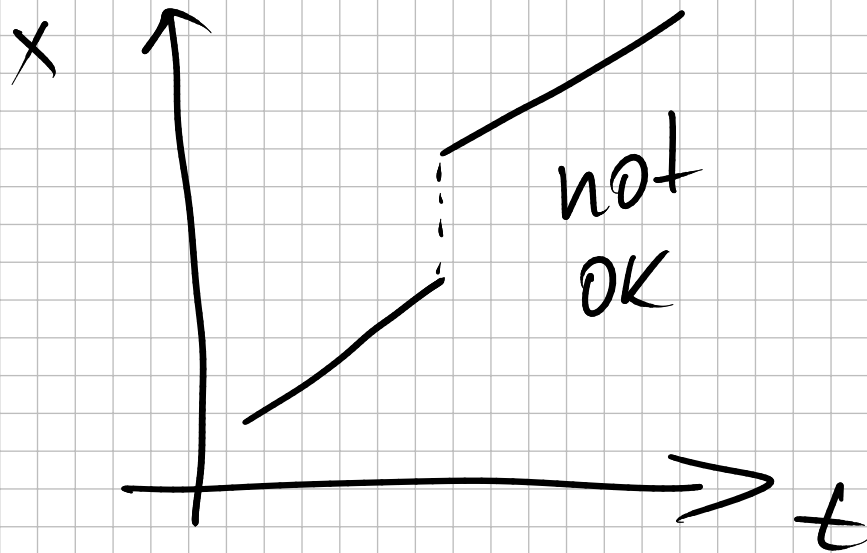
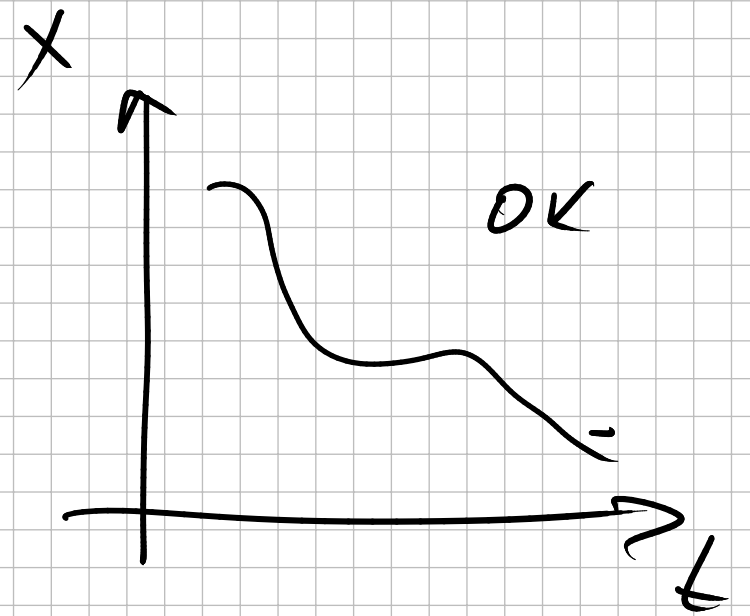
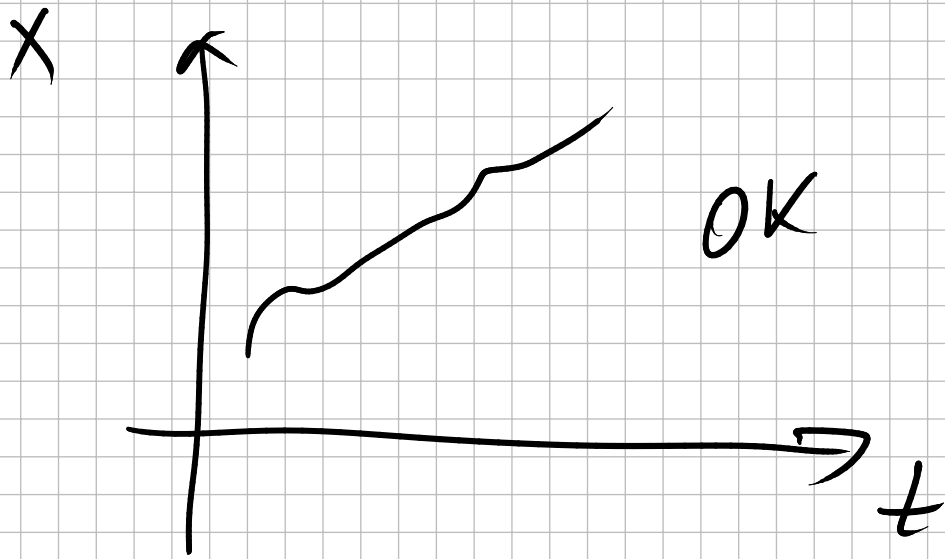
velocity 'v'

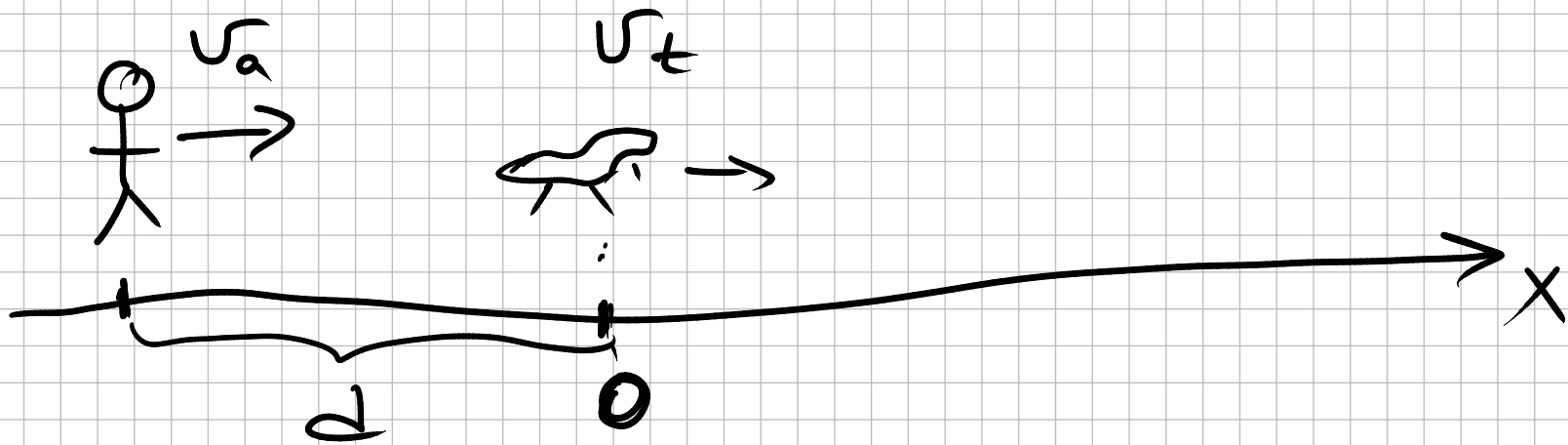
average velocity  $\bar{v} = \frac{x_f - x_i}{t_f - t_i}$

speed  $|v| = |\bar{v}|$

average acceleration  $\bar{a} = \frac{v_f - v_i}{t_f - t_i}$







$$x(t) = x_0 + v \cdot t \quad \text{if } a = 0$$

$\uparrow$   
 $t=0$

$$A: \quad x_a(t) = x_a^0 + v_a \cdot t$$

$$T: \quad x_T(t) = x_T^0 + v_T \cdot t$$

$$-d + v_a \cdot t = v_T \cdot t$$

$$t = \frac{d}{v_a - v_T}$$

$$d = 10 \text{ m}$$

$$v_a = 10 \text{ m/s}$$

$$v_T = 0.1 \text{ m/s}$$

only 1 significant figure

$$t = \frac{10}{10 - 0.1} =$$

$$= \frac{10}{9.9} \approx$$

~~1.01~~...  
over  
precision

$$d = 10 \text{ m}$$

$$v_a = 10 \text{ m/s}$$

$$v_T = 12 \text{ m/s}$$

$$t = \frac{10 \text{ m}}{10 \frac{\text{m}}{\text{s}} - 12 \frac{\text{m}}{\text{s}}} =$$

$$= \frac{10}{-2} = -5 \text{ s}$$