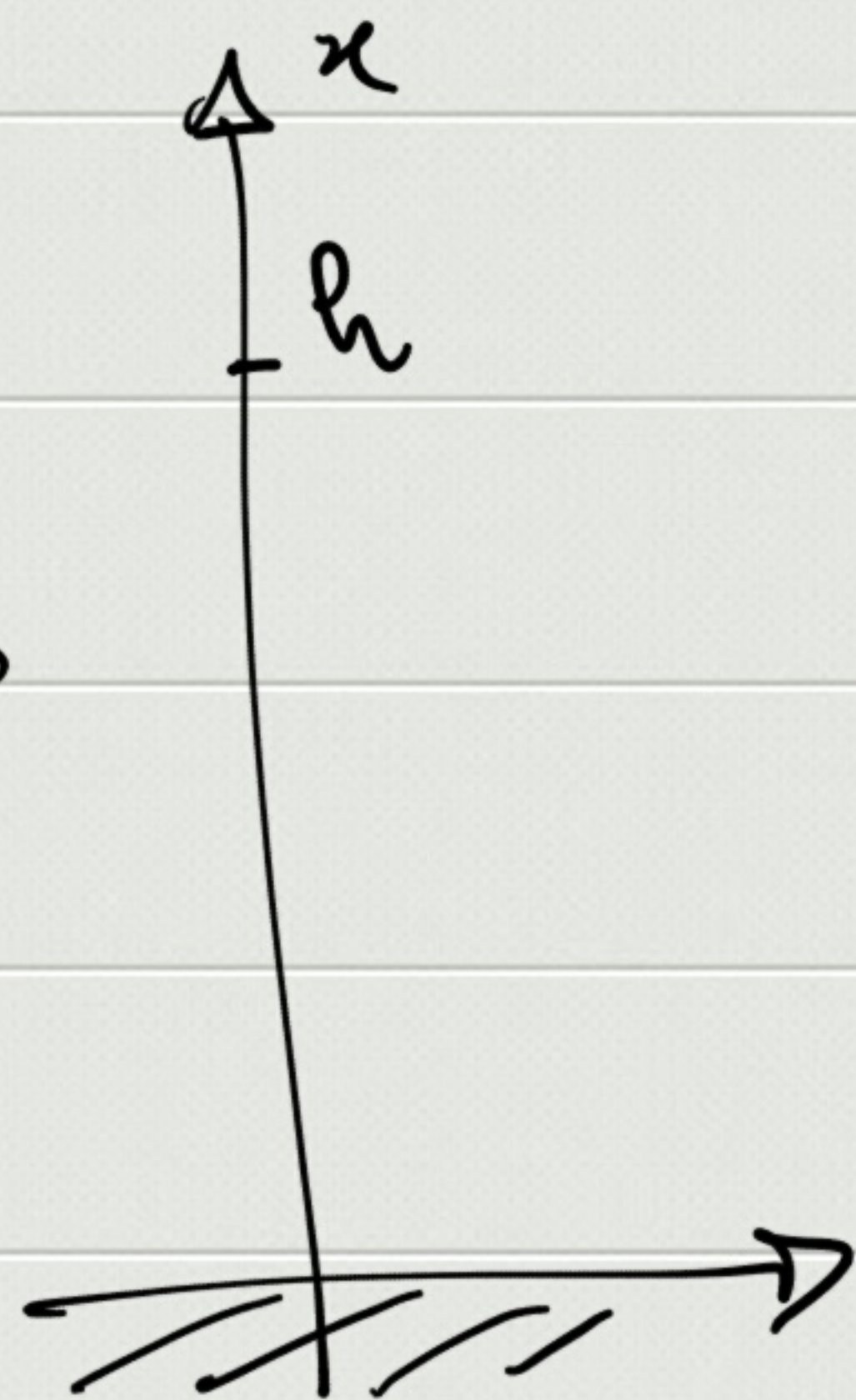


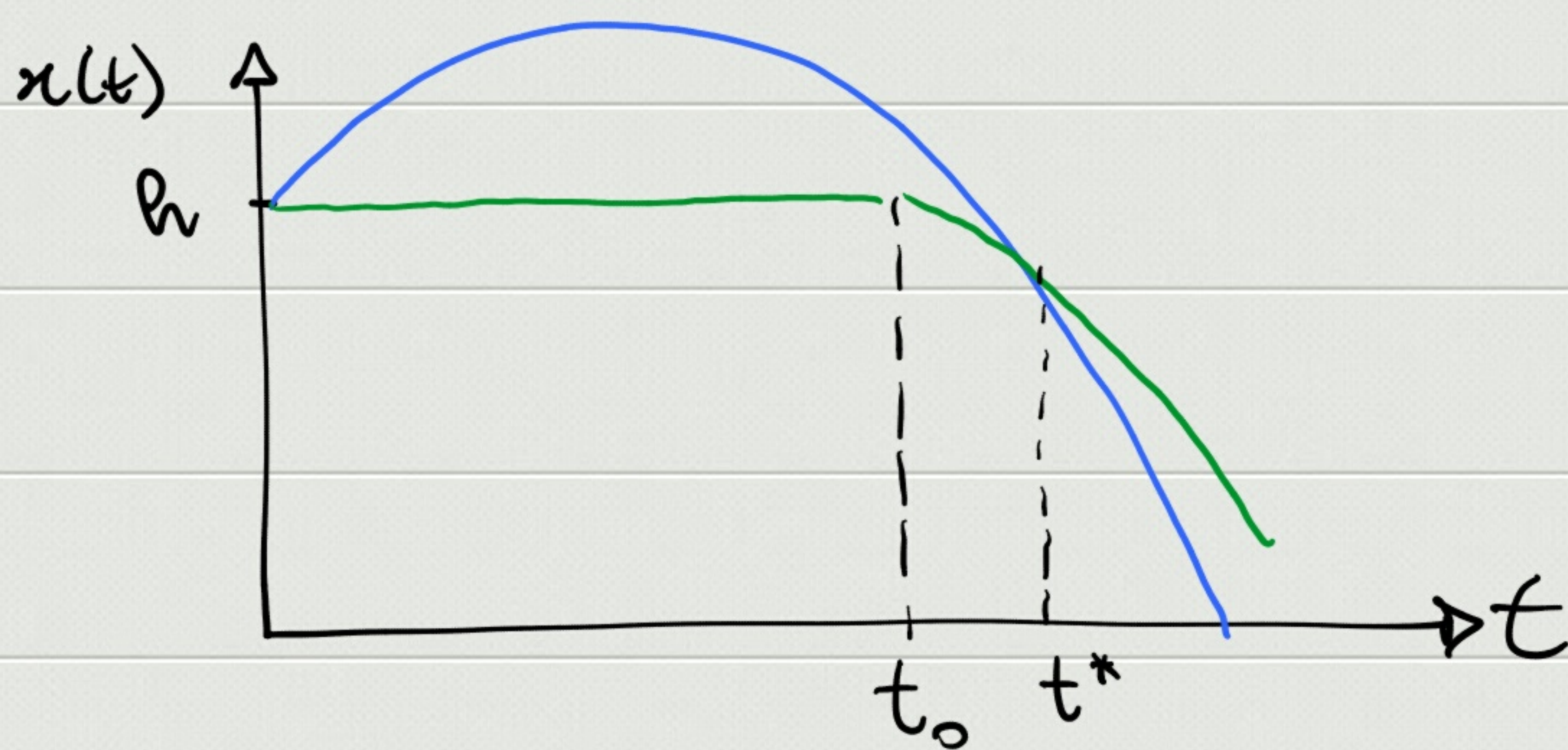
$$x_{01} = x_{02} = h > 0$$

$$v_{01} = v_0 > 0 \quad v_{02} = 0 \quad t_{02} = t_0$$



$$\textcircled{1} \quad x_1(t) = h + v_0 t - \frac{1}{2} g t^2 \quad *$$

$$\textcircled{2} \quad x_2(t) = h - \frac{1}{2} g (t - t_0)^2 \quad *$$



$$x_1(t^*) = x_2(t^*)$$

$$h + v_0 t^* - \frac{1}{2} g t^{*2} = h - \frac{1}{2} g (t^* - t_0)^2$$

$$v_0 t^* - \frac{1}{2} g t^{*2} = -\frac{1}{2} g t^{*2} + g t^* t_0 - \frac{1}{2} g t_0^2$$

$$t^* (v_0 - g t_0) = -\frac{1}{2} g t_0^2 \Rightarrow t^* = \frac{g t_0^2}{2(g t_0 - v_0)}$$

$$t^* = \frac{gt_0^2}{2(gt_0 - v_0)} > \cancel{t_0}^1$$

$$gt_0 - v_0 > 0 \left(\Rightarrow t_0 > \frac{v_0}{g} \right) \Rightarrow gt_0 > 2(gt_0 - v_0)$$

$$gt_0 < v_0 \cdot 2 \Rightarrow t_0 < \frac{2v_0}{g}$$

$$\boxed{\frac{v_0}{g} < t_0 < \frac{2v_0}{g}}$$

~~$$gt_0 - v_0 < 0 \left(\Rightarrow t_0 < \frac{v_0}{g} \right) \Rightarrow gt_0 < 2(gt_0 - v_0)$$~~

~~$$\Rightarrow gt_0 > 2v_0 \quad t_0 > \frac{2v_0}{g}$$~~