

$$t=0 \quad v_{0A} = 1 \text{ m/s} \quad a_A = 2 \text{ m/s}^2 = \text{const}$$

$$v_{0B} = 3 \text{ m/s} \quad a_B = 1 \text{ m/s}^2 = \text{const}$$

$$x_{0A} = x_{0B} + 1.5 \quad (\text{m})$$

$$\begin{cases} x_A(t) = x_{0A} + v_{0A}t + \frac{1}{2}a_At^2 \\ x_B(t) = x_{0B} + v_{0B}t + \frac{1}{2}a_Bt^2 \end{cases}$$

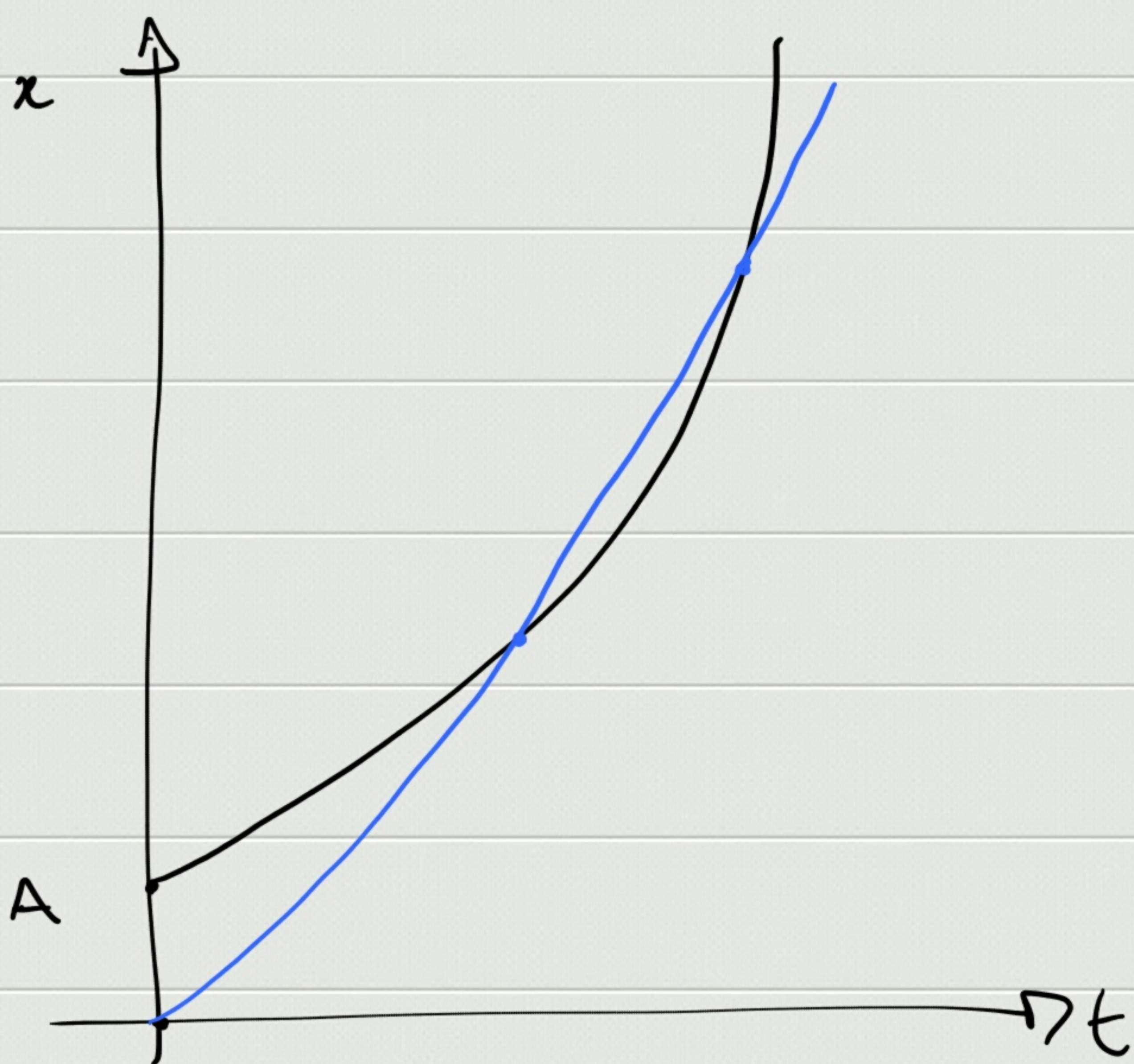
$$x_A(t^*) = x_B(t^*)$$

$$0 = (x_{0A} - x_{0B}) + (v_{0A} - v_{0B})t + \frac{1}{2}(a_A - a_B)t^2$$

$$t^2 + \frac{2(v_{0A} - v_{0B})}{a_A - a_B}t + \frac{2(x_{0A} - x_{0B})}{a_A - a_B} = 0$$

$$t = -\frac{v_{0A} - v_{0B}}{a_A - a_B} \pm \sqrt{\left(\frac{v_{0A} - v_{0B}}{a_A - a_B}\right)^2 - \frac{2(x_{0A} - x_{0B})}{a_A - a_B}}$$

$$t = \begin{cases} 1 \text{ s} \\ 3 \text{ s} \end{cases} \Rightarrow \begin{aligned} x_1 &= x_{0B} + 3.5 \quad (\text{m}) \\ x_2 &= x_{0B} + 13.5 \quad (\text{m}) \end{aligned}$$



$$v_0 = 100 \text{ km/h}$$

$$a = \text{const} \quad (a < 0)$$

$$d = 100 \text{ m} \quad v_1 = 65 \text{ km/h}$$

$$a = ?$$

$$- v_1^2 = v_0^2 + 2ad \quad *$$

$$- v_0^2 = v_1^2 + 2ad$$

$$- v_1^2 = v_0^2 - 2ad \quad (* \quad a = |a|)$$

$$- \begin{cases} v_1 = v_0 + at \\ d = v_0 t + \frac{1}{2} at^2 \end{cases} \quad *$$

$$a = \frac{v_1^2 - v_0^2}{2d} \approx \underline{\underline{-2.3 \text{ m/s}^2}}$$

$$t = \frac{v_1 - v_0}{a} \Rightarrow d = v_0 \frac{v_1 - v_0}{a} + \frac{1}{2} a \frac{(v_1 - v_0)^2}{a^2} = \frac{v_1^2 + v_0^2 - 2v_1 v_0}{2a}$$

$$\Rightarrow a = \frac{v_1^2 - v_0^2}{2d}$$

$$d' = ?$$

$$- \begin{cases} 0 = v_0 + a t_2 \\ d' = v_0 t_2 + \frac{1}{2} a t_2^2 \end{cases} *$$

$$v_f = v_i + a (t_f - t_i)$$

$$- v_0^2 = 2 a d'$$

$$- 0 = v_0^2 + 2 a d' \quad * \Rightarrow d' = - \frac{v_0^2}{2 a} = 173 \text{ m}$$

$$- \begin{cases} 0 = v_0 + a t_2 \\ d' = d + v_0 t_2 + \frac{1}{2} a t_2^2 \end{cases}$$

$$t_2 : t_2 = - \frac{v_0}{a} = 12.5 \text{ s}$$