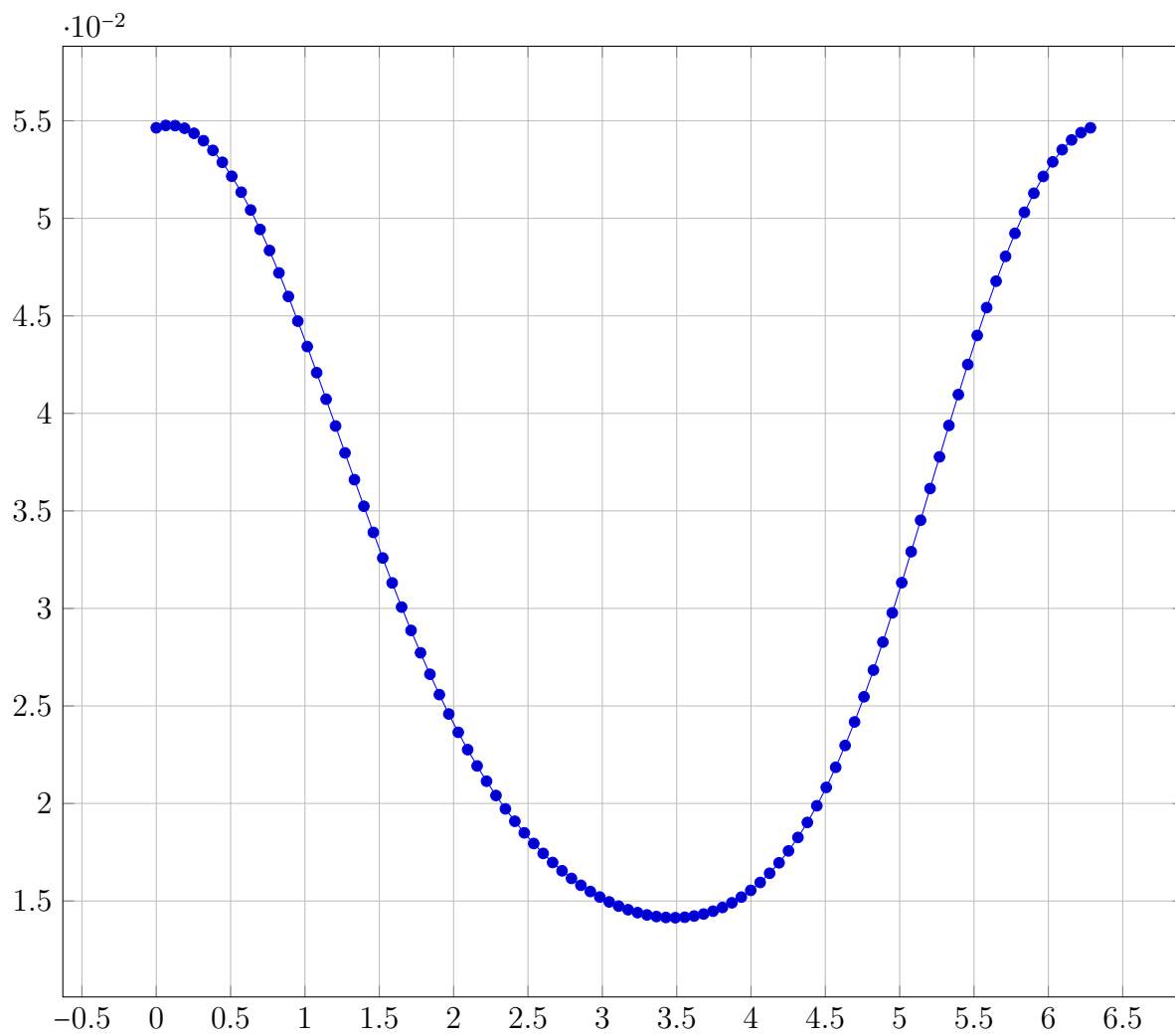


1 Формулы

$$l_1 \cdot \cos(\phi) + l_2 \cdot \cos\left(\arcsin\left(\frac{e_1 - l_1 \cdot \sin(\phi)}{l_2}\right)\right) = x(\phi) \quad (1)$$



$$l_1 \cdot \cos(\phi_n) + l_2 \cdot \cos\left(\arcsin\left(\frac{e_1 - l_1 \cdot \sin(\phi_n)}{l_2}\right)\right) = x_{c_1} \quad (2)$$

$$\begin{aligned} 0.02 \cdot \cos(\pi) + 0.035 \cdot \cos\left(\arcsin\left(\frac{0.25 \cdot 0.02 - 0.02 \cdot \sin(\pi)}{0.035}\right)\right) = \\ = -0.02 + 0.035 \cdot 0.0285714 = 0.014641 = x_{c_1} \end{aligned} \quad (3)$$

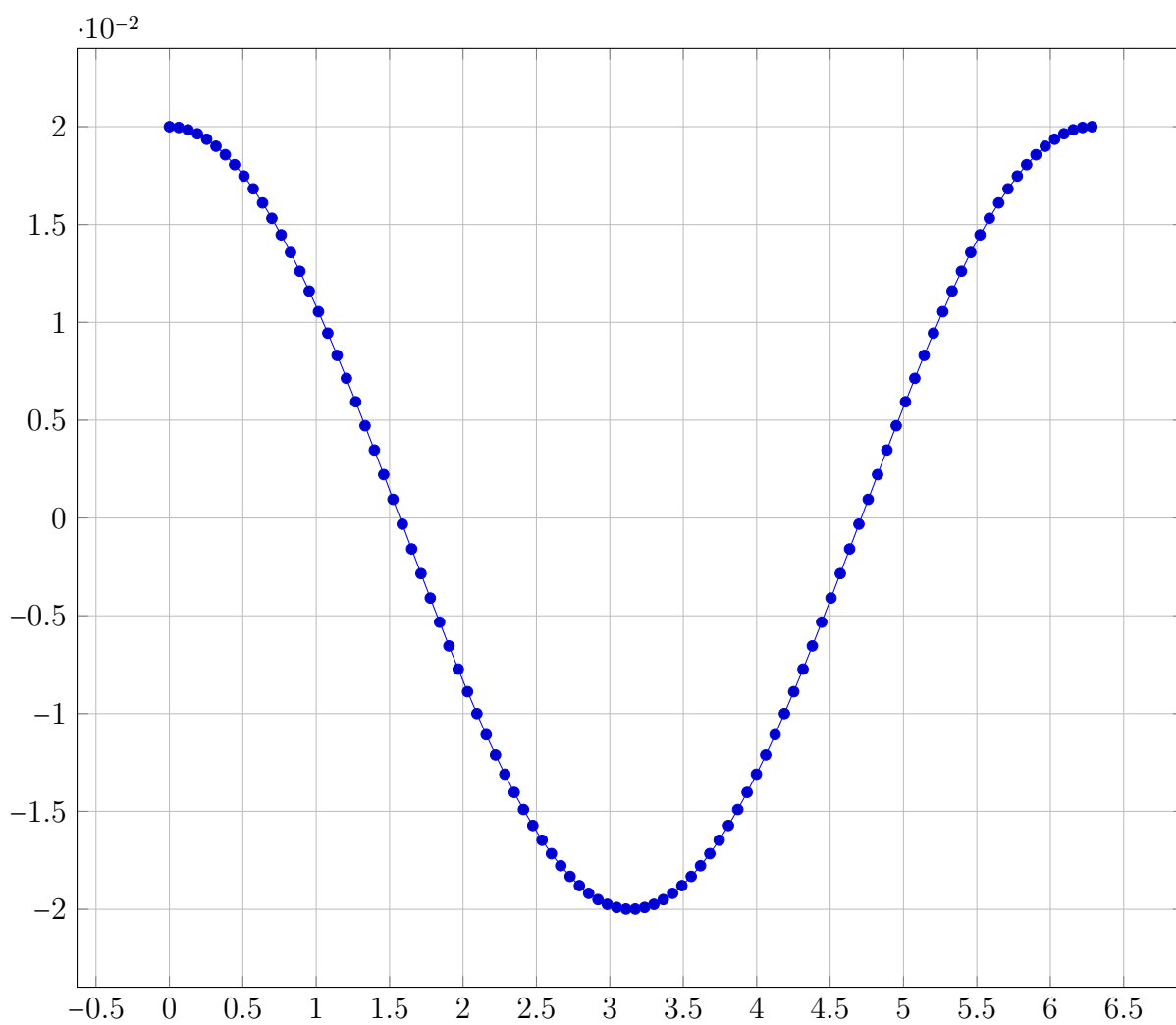
$$y_{c_1} = 0 \quad (4)$$

$$l_1 \cdot \cos(\phi_k) + l_2 \cdot \cos\left(\arcsin\left(\frac{e_1 - l_1 \cdot \sin(\phi_k)}{l_2}\right)\right) = x_{c_2} \quad (5)$$

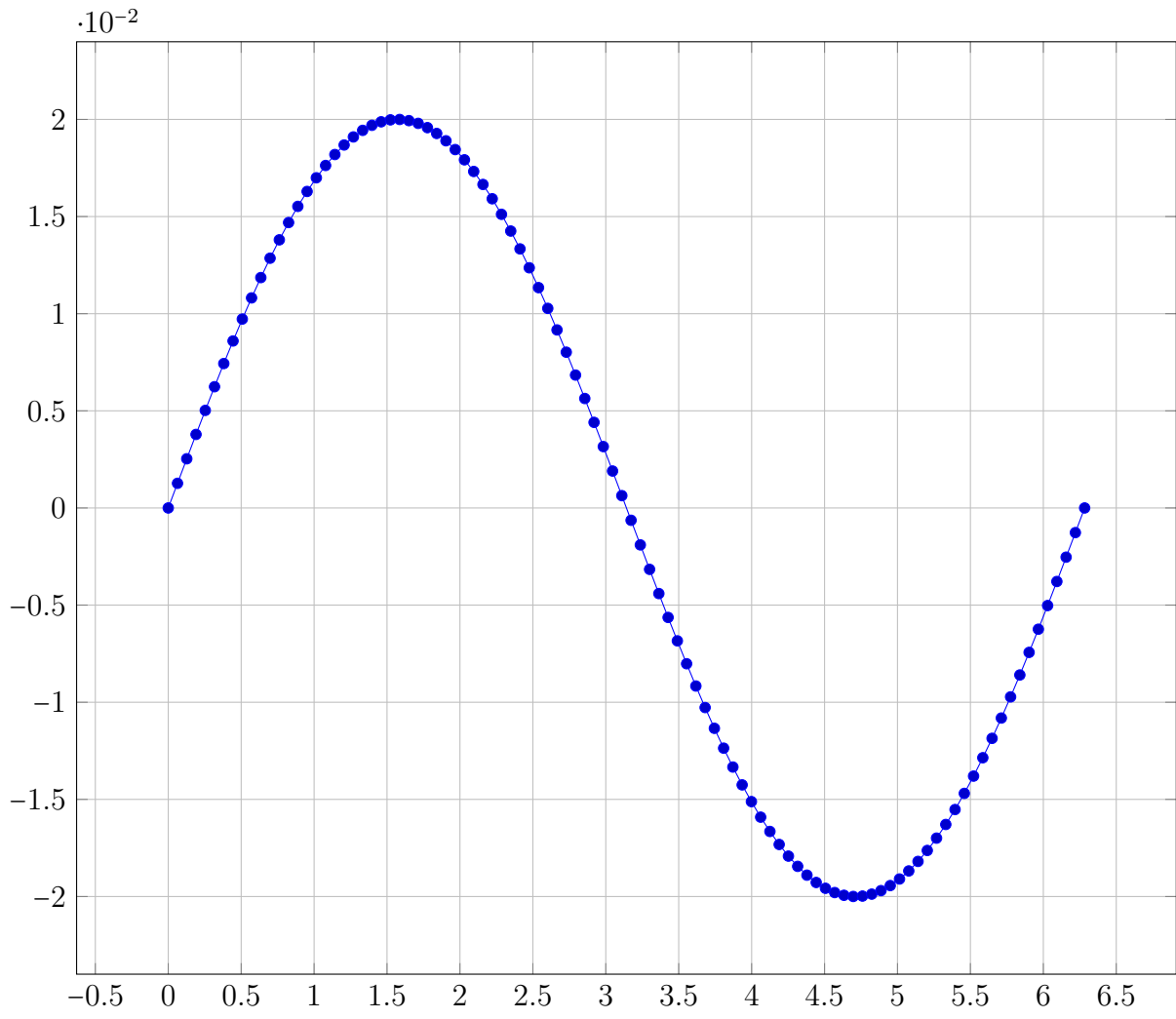
$$y_{c_2} = 0 \quad (6)$$

Координаты A :

$$x_A = l_1 \cdot \cos(\phi) \quad (7)$$



$$y_A = l_1 \cdot \sin(\phi) \quad (8)$$



Changed

$$x_B = l_1 \cdot \cos(\phi_n) + \sqrt{l_2^2 - (l_1 \cdot \sin(\phi_n) - e_1)^2} = \frac{-1 + \sqrt{3}}{50} \approx 0.014641 \quad (9)$$

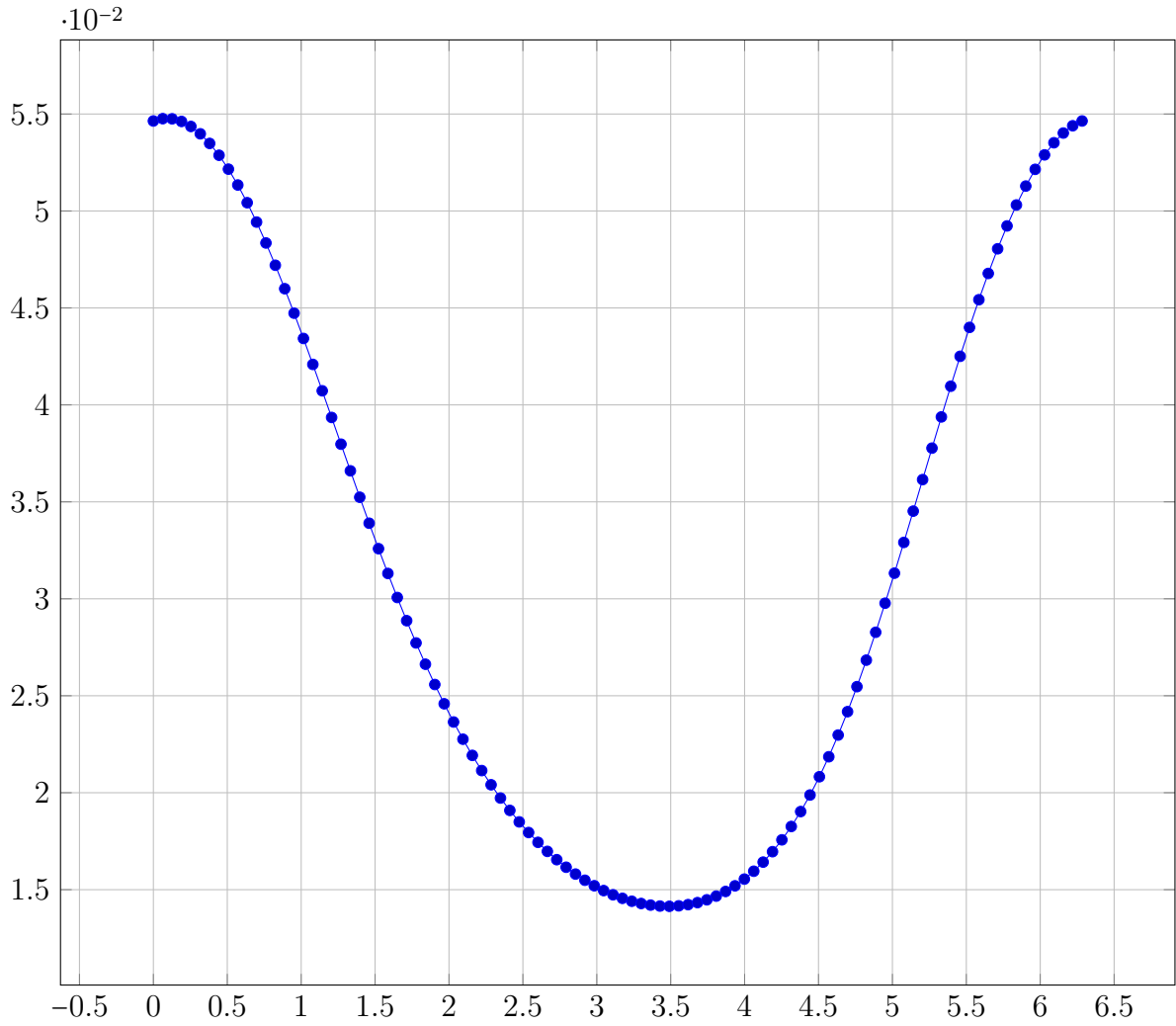


Рисунок 1. x_B

Changed

$$y_B = e_1 = 0.005 \quad (10)$$

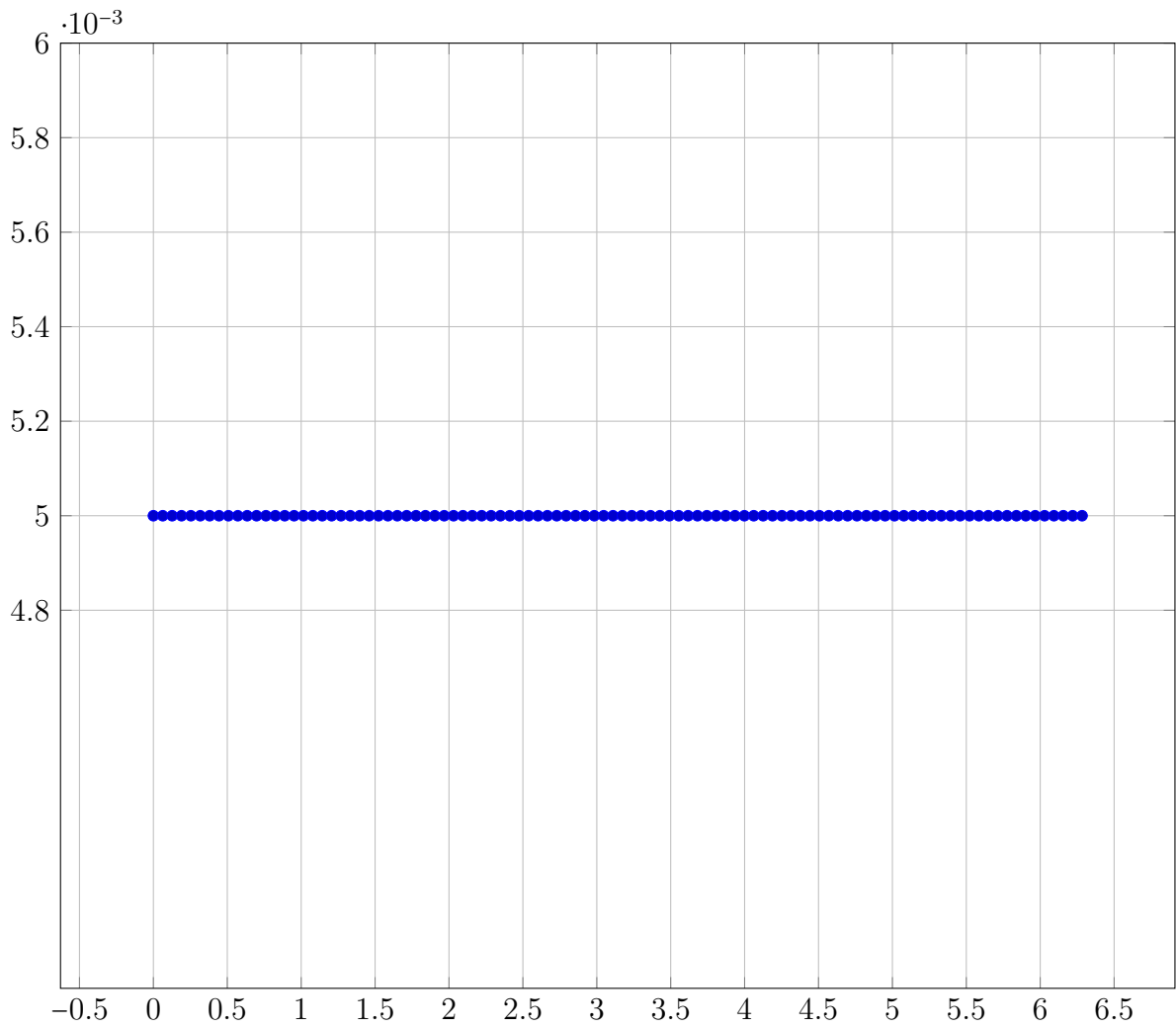
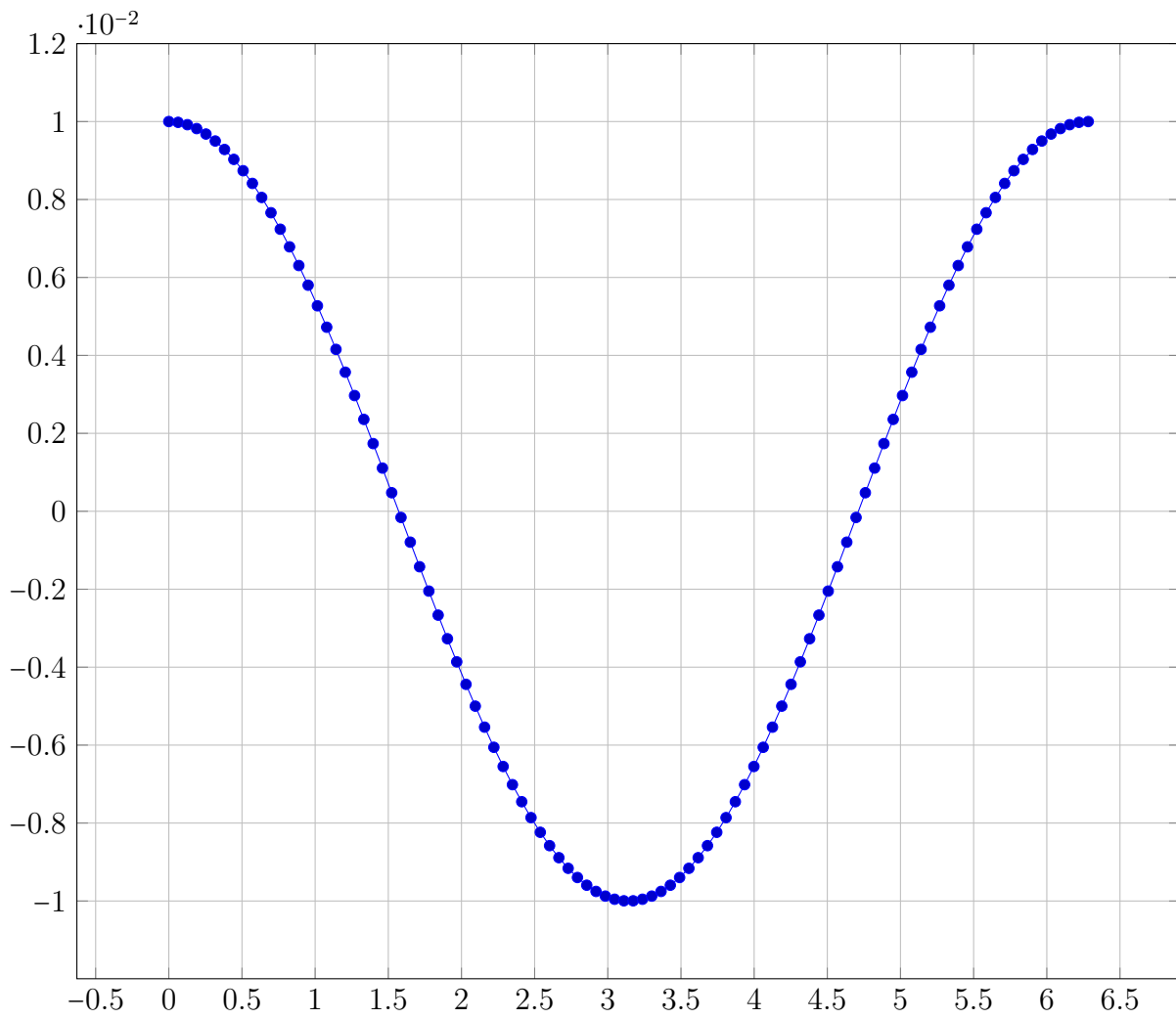


Рисунок 2. y_B

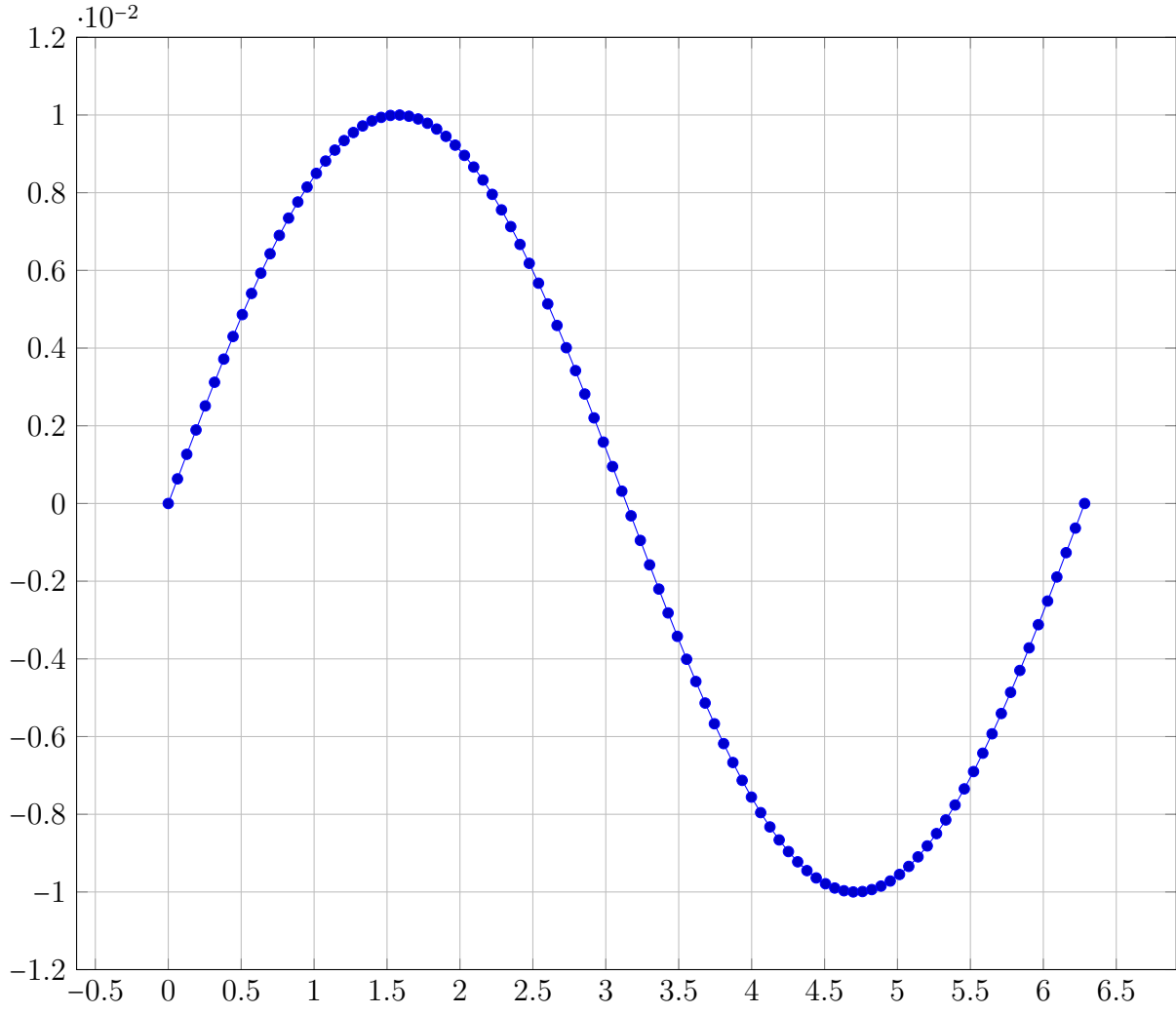
Середина первого звена OA : TODO

$$x_{OA} = \frac{x_O + x_A}{2} = \frac{0 + l_1 \cdot \cos(\phi)}{2} = \frac{l_1 \cdot \cos(\phi)}{2} \quad (11)$$

TODO



$$y_{OA} = \frac{y_O + y_A}{2} = \frac{0 + l_1 \cdot \sin(\phi)}{2} = \frac{l_1 \cdot \sin(\phi)}{2} \quad (12)$$



Середина второго звена AB : OLD

$$x_{AB} = \frac{l_1 \cdot \cos(\phi) + l_1 \cdot \cos(\phi) + l_2 \cdot \cos\left(\arcsin\left(\frac{e_1 - l_1 \cdot \sin(\phi)}{l_2}\right)\right)}{2} =$$

$$= \frac{2 \cdot l_1 \cdot \cos(\phi) + l_2 \cdot \cos\left(\arcsin\left(\frac{e_1 - l_1 \cdot \sin(\phi)}{l_2}\right)\right)}{2} \quad (13)$$

NEW

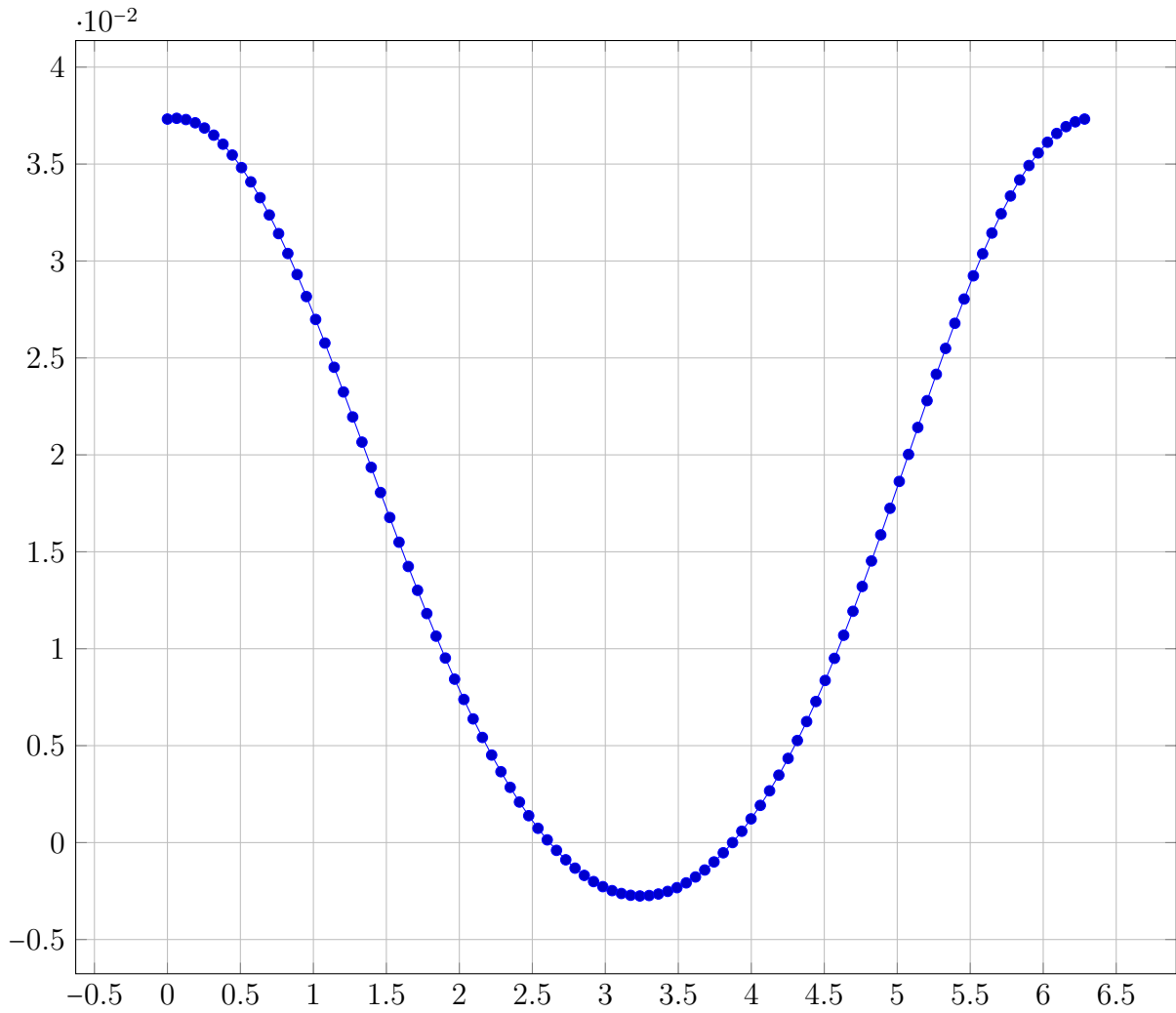


Рисунок 3. x_{AB}

$$y_{AB} = \frac{y_A + y_{c1}}{2} = \frac{l_1 \cdot \sin(\phi) + 0}{2} = \frac{l_1 \cdot \sin(\phi)}{2} \quad (14)$$

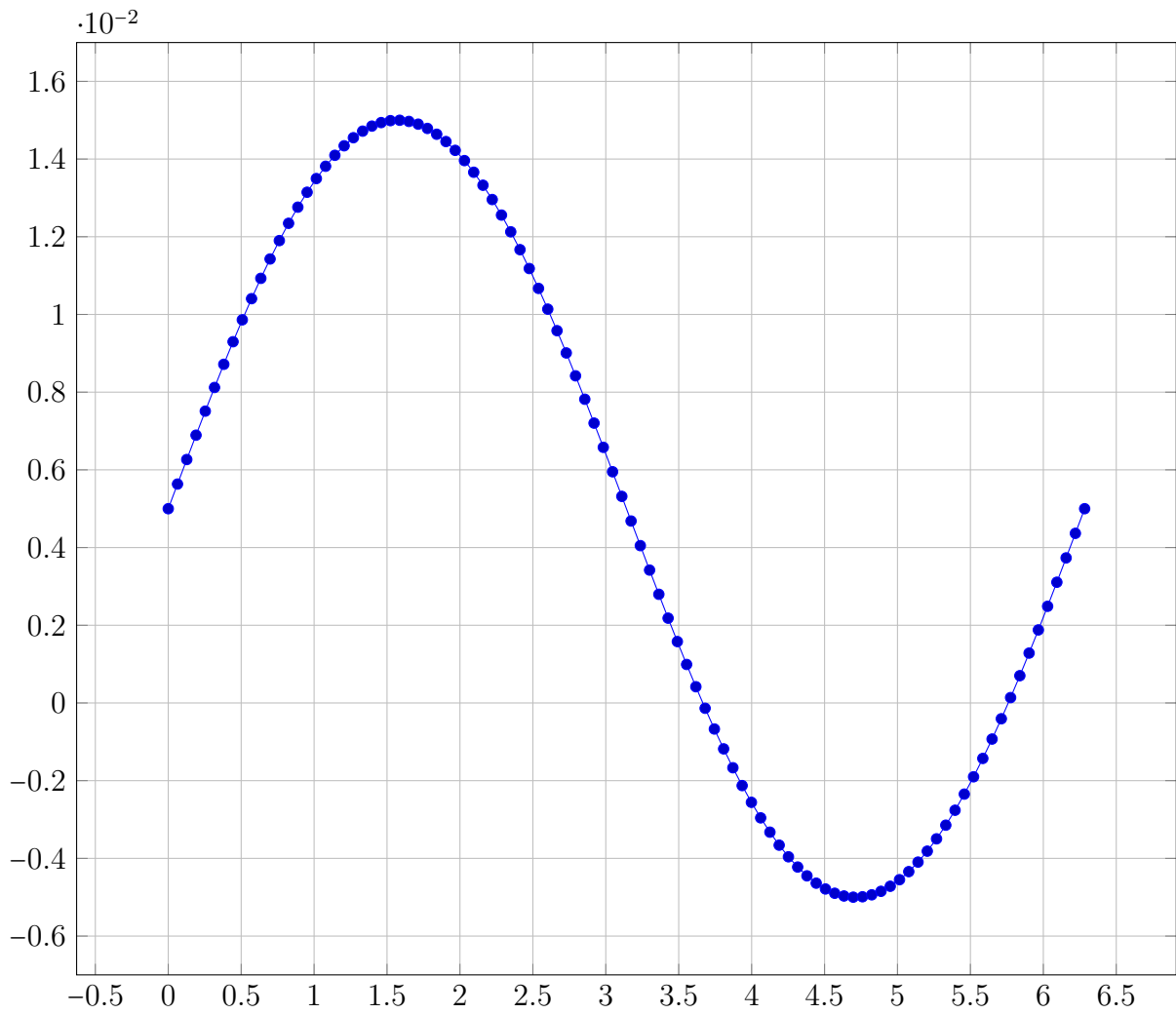
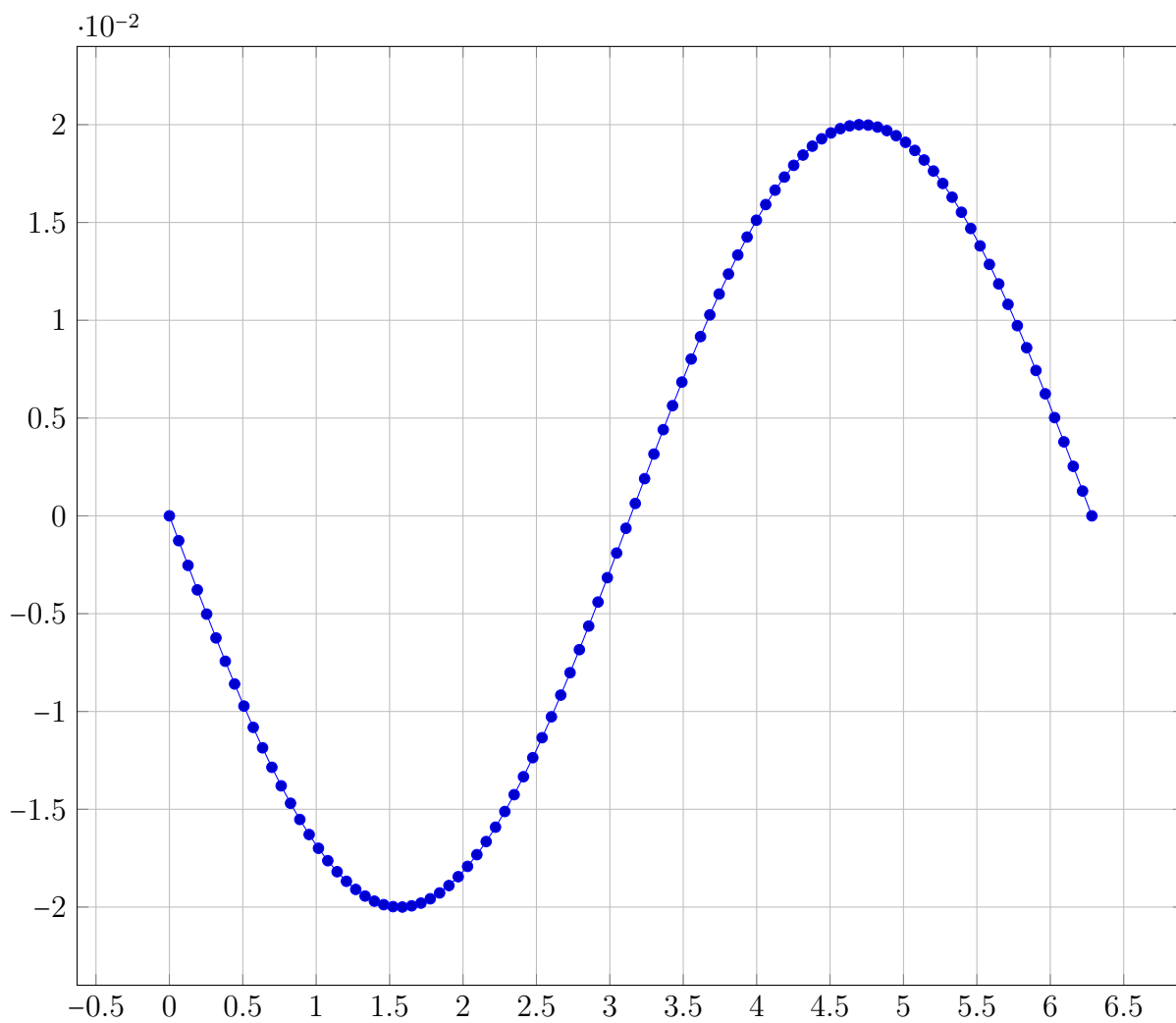


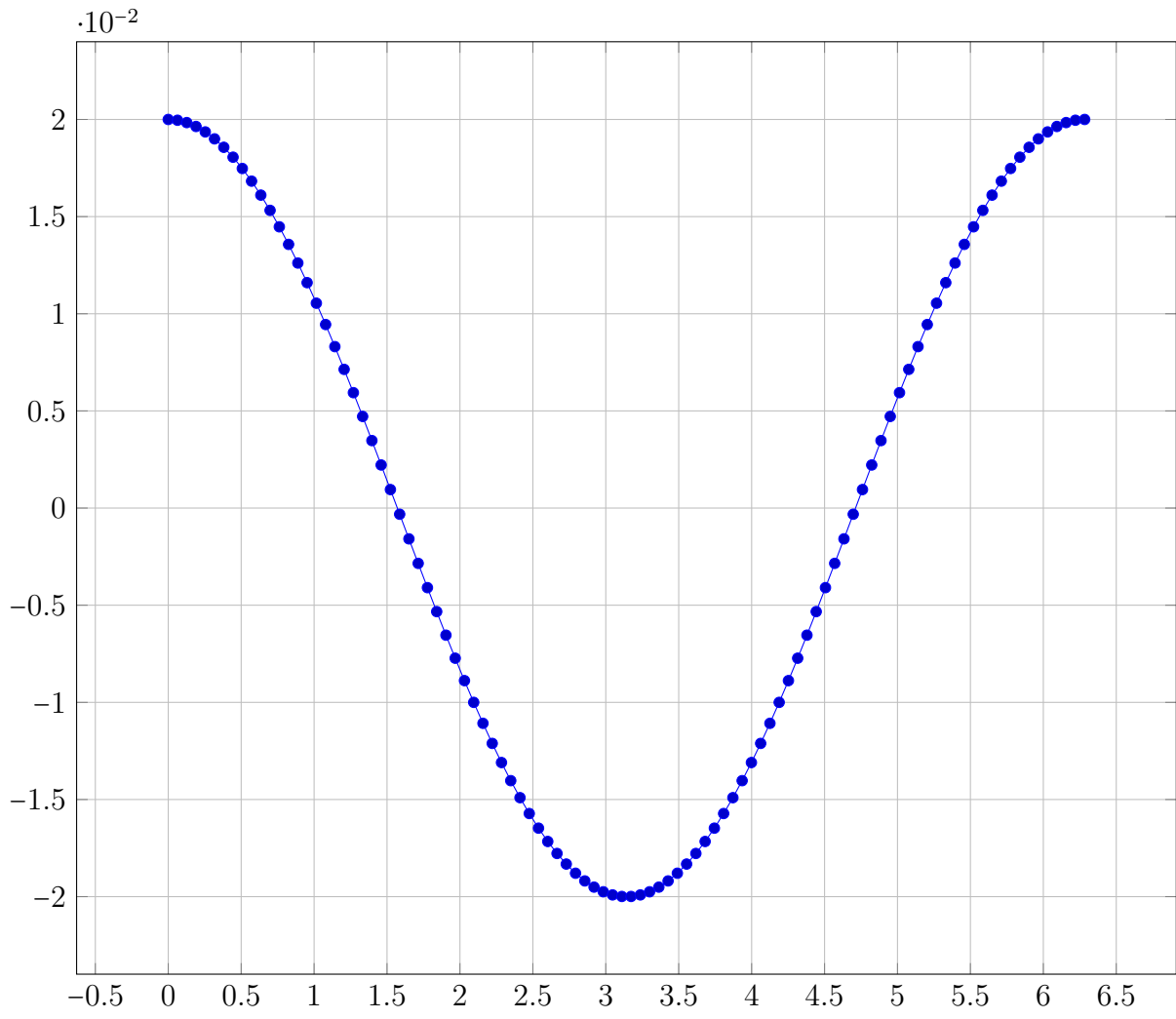
Рисунок 4. y_{AB}

Найдём производные A , OA , AB по ϕ :

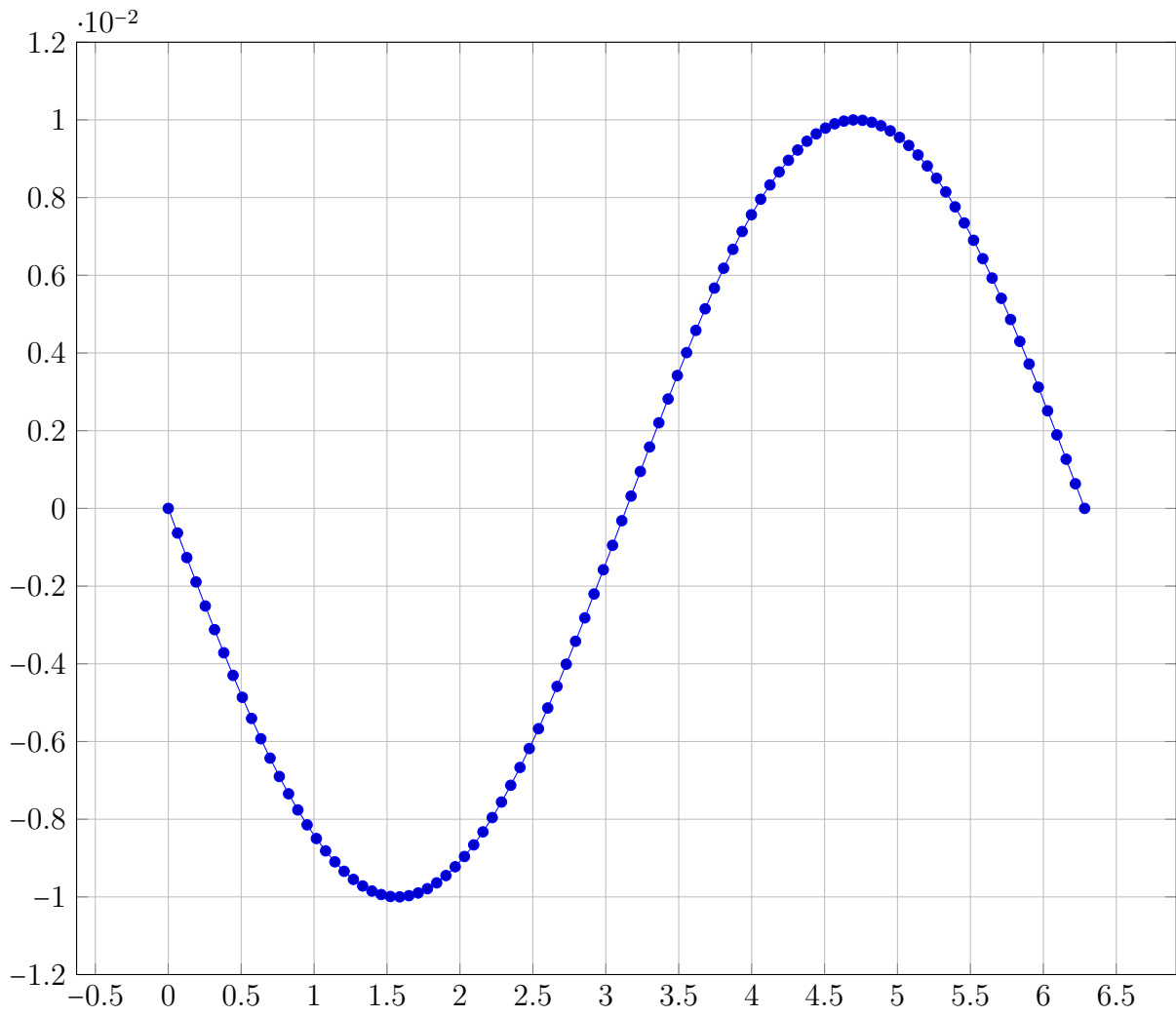
$$x'_A = -l_1 \cdot \sin(\phi) \quad (15)$$



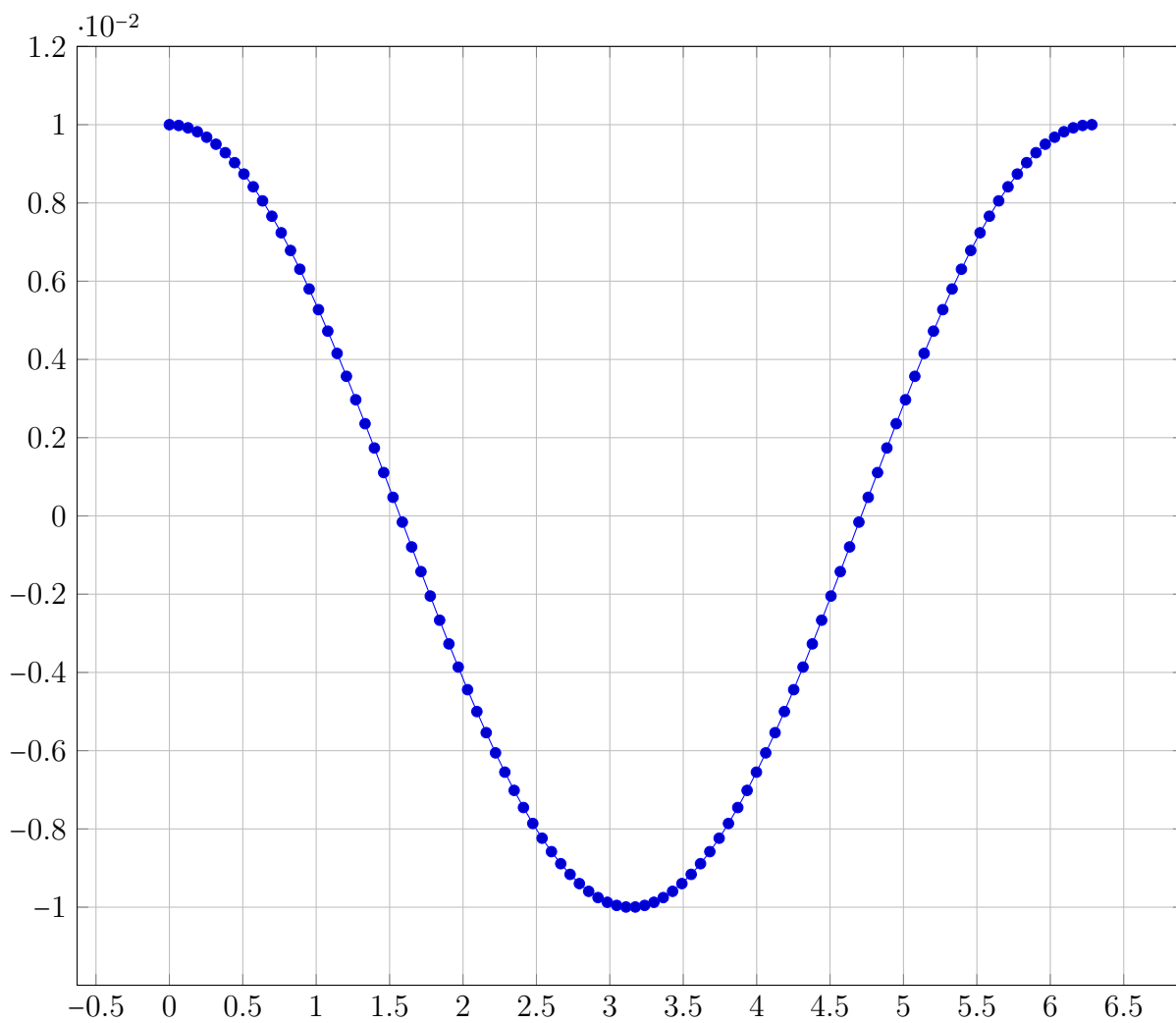
$$y'_A = l1 \cdot \cos(\phi) \quad (16)$$



$$x'_{OA} = \frac{-l_1 \cdot \sin(\phi)}{2} \quad (17)$$



$$y'_{OA} = \frac{l_1 \cdot \cos(\phi)}{2} \quad (18)$$

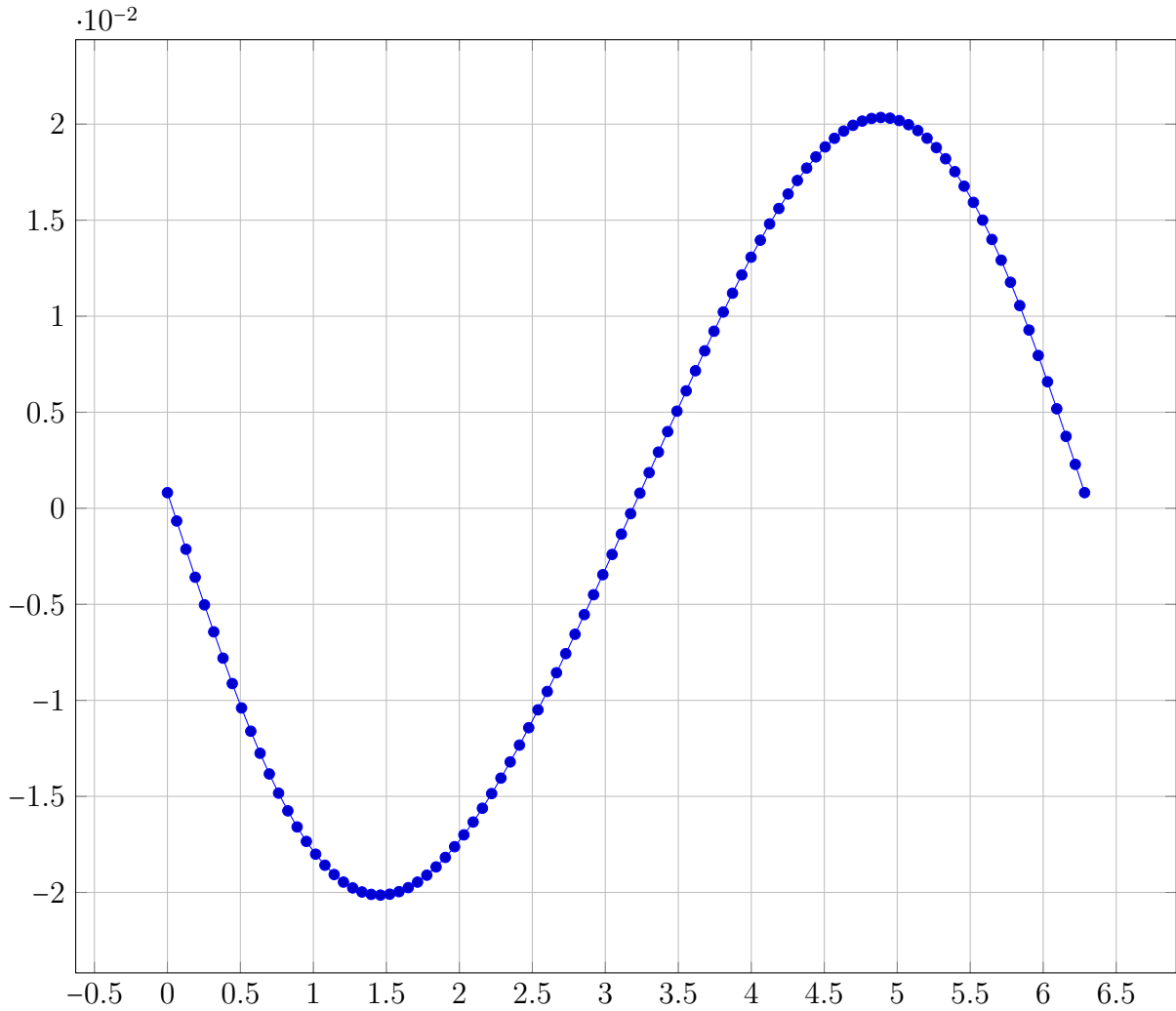


OLD

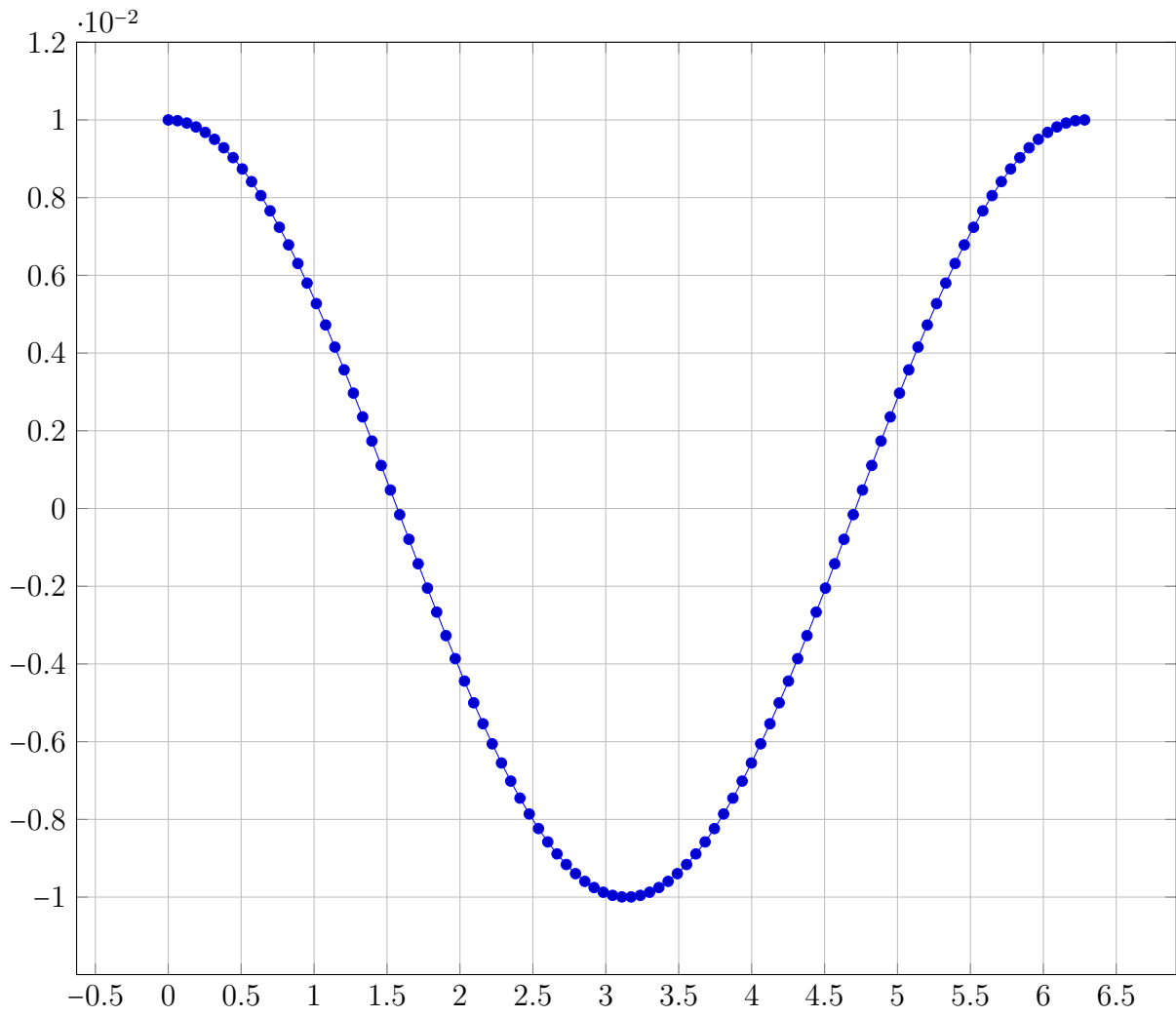
$$x'_{AB} = -l_1 \cdot \sin(\phi) + \frac{l_2^2 \cdot \left(\frac{e_1}{2} - \frac{1}{2} \cdot l_2 \cdot \sin(\phi) \right) \cdot \cos(\phi)}{4 \cdot \sqrt{1 - \left(\frac{e_1}{2} - \frac{1}{2} \cdot l_2 \cdot \sin(\phi) \right)^2}} \quad (19)$$

NEW

$$x_{AB} \left(\frac{1}{2} \sqrt{l_2^2 - (l_1 \sin(x) - e_1)^2} + l_1 \cos(x) \right) = \frac{1}{2} \left(-l_1^2 \cos^2(x) \right) / \sqrt{l_2^2 - (l_1 \sin(x) - e_1)^2} - \frac{l_1^2 \cos^2(x) (l_1 \sin(x) - e_1)^2}{(l_2^2 - (l_1 \sin(x) - e_1)^2)^{\frac{3}{2}}} + \frac{l_1 \sin(x) (l_1 \sin(x) - e_1)}{\sqrt{l_2^2 - (l_1 \sin(x) - e_1)^2} - l_1 \cos(x)} \quad (20)$$

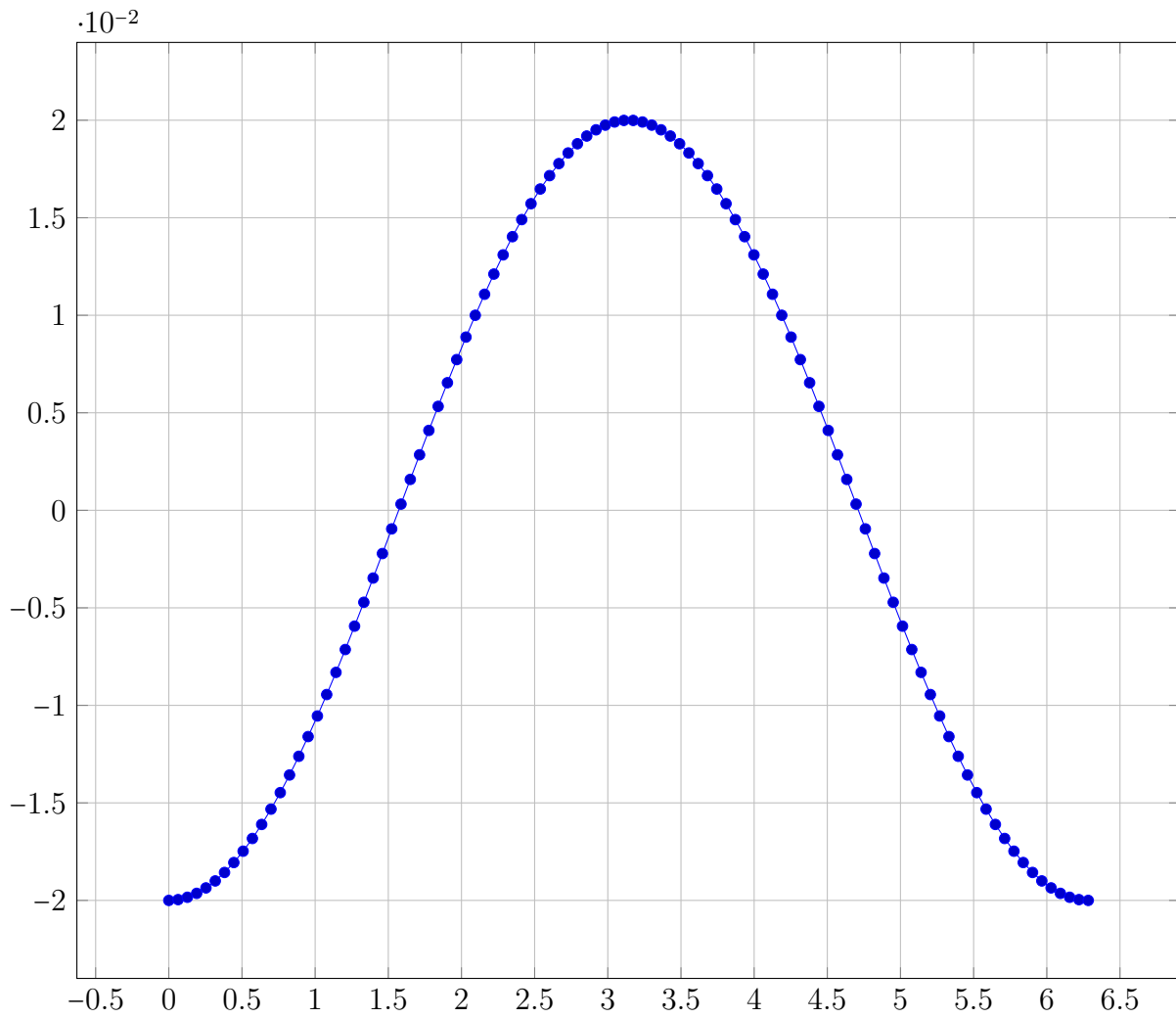


$$y'_{AB} = \frac{l_1 \cdot \cos(\phi)}{2} \quad (21)$$

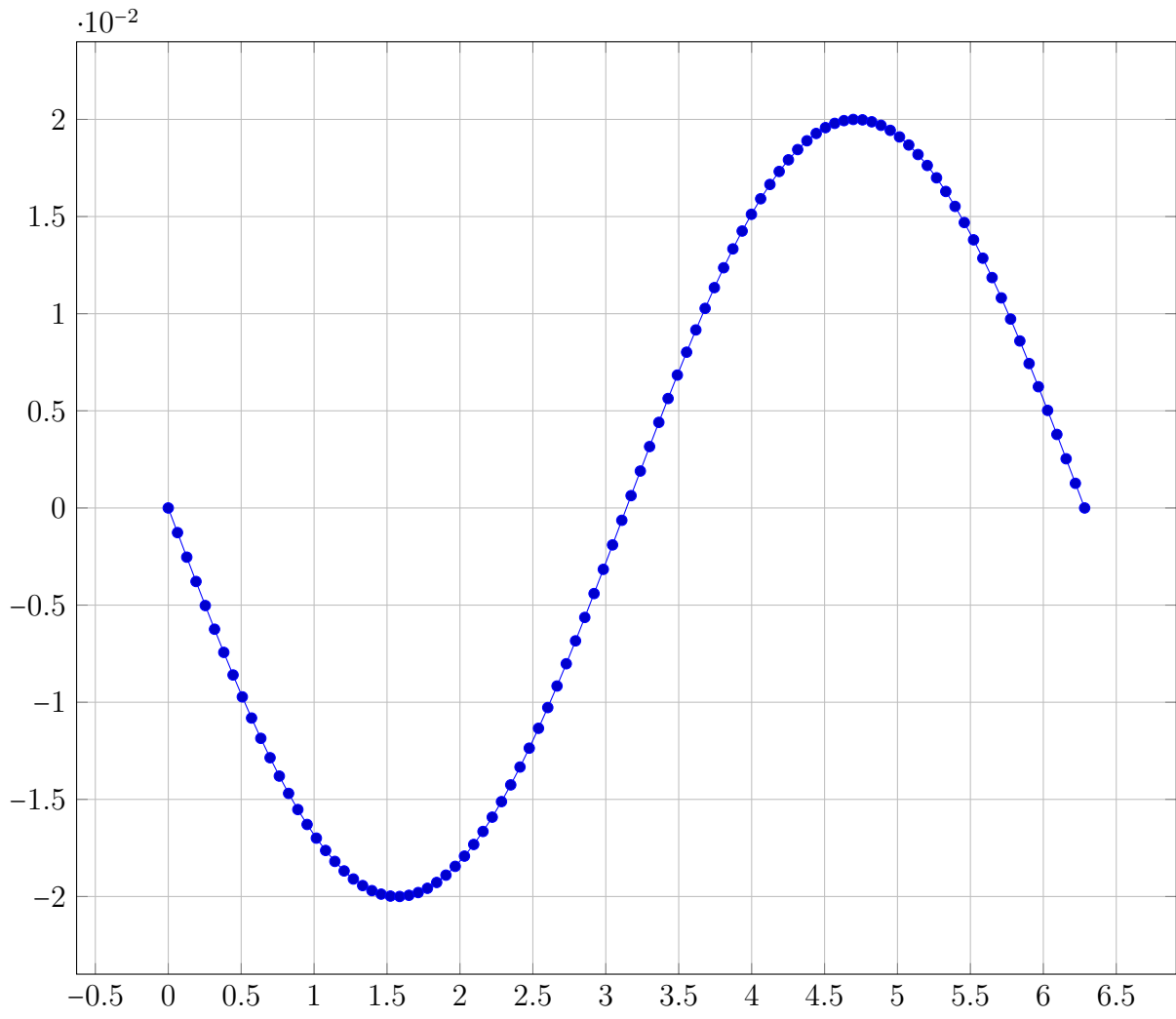


Найдём вторые производные:

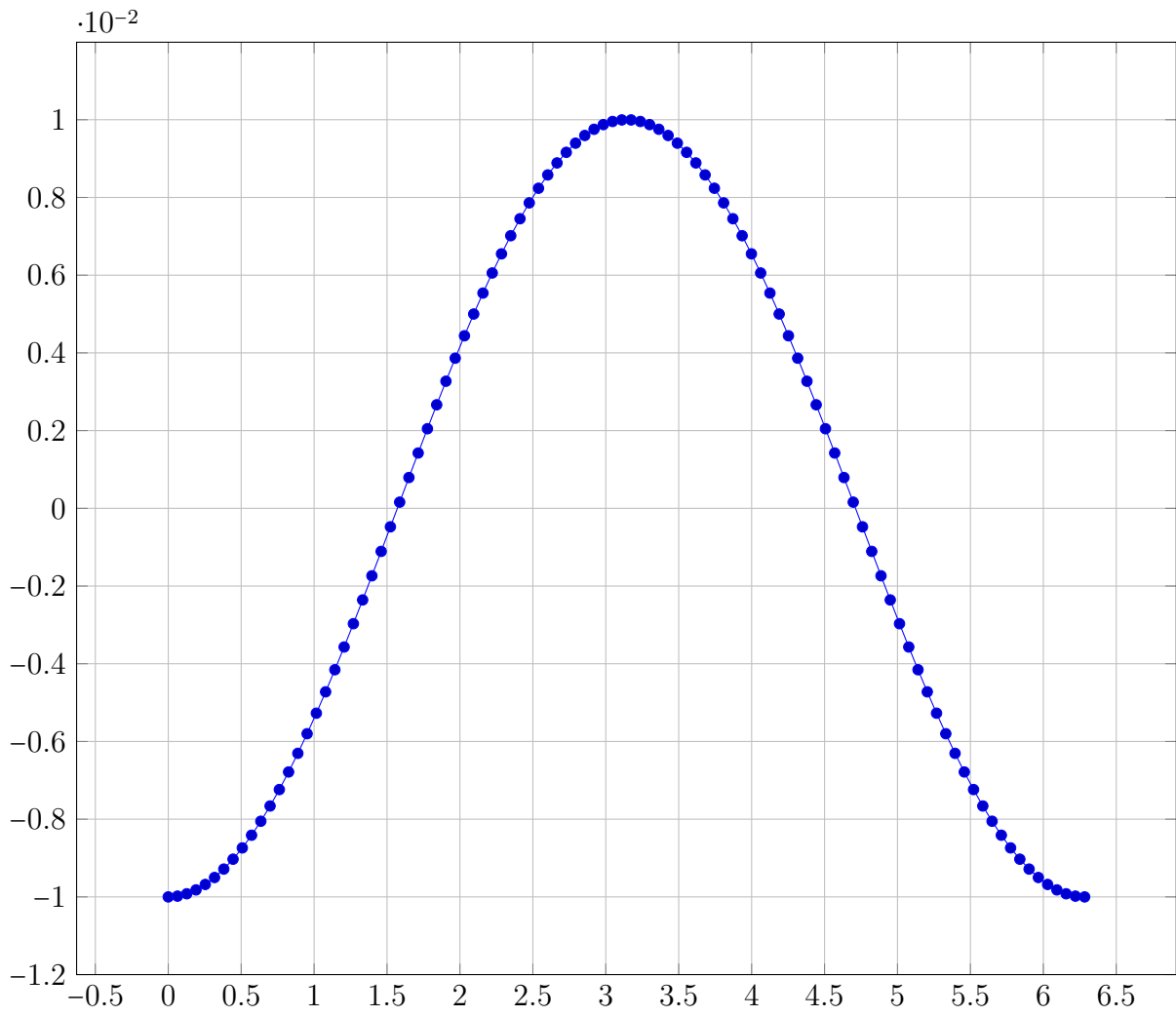
$$x_A'' = -l_1 \cdot \cos(\phi) \quad (22)$$



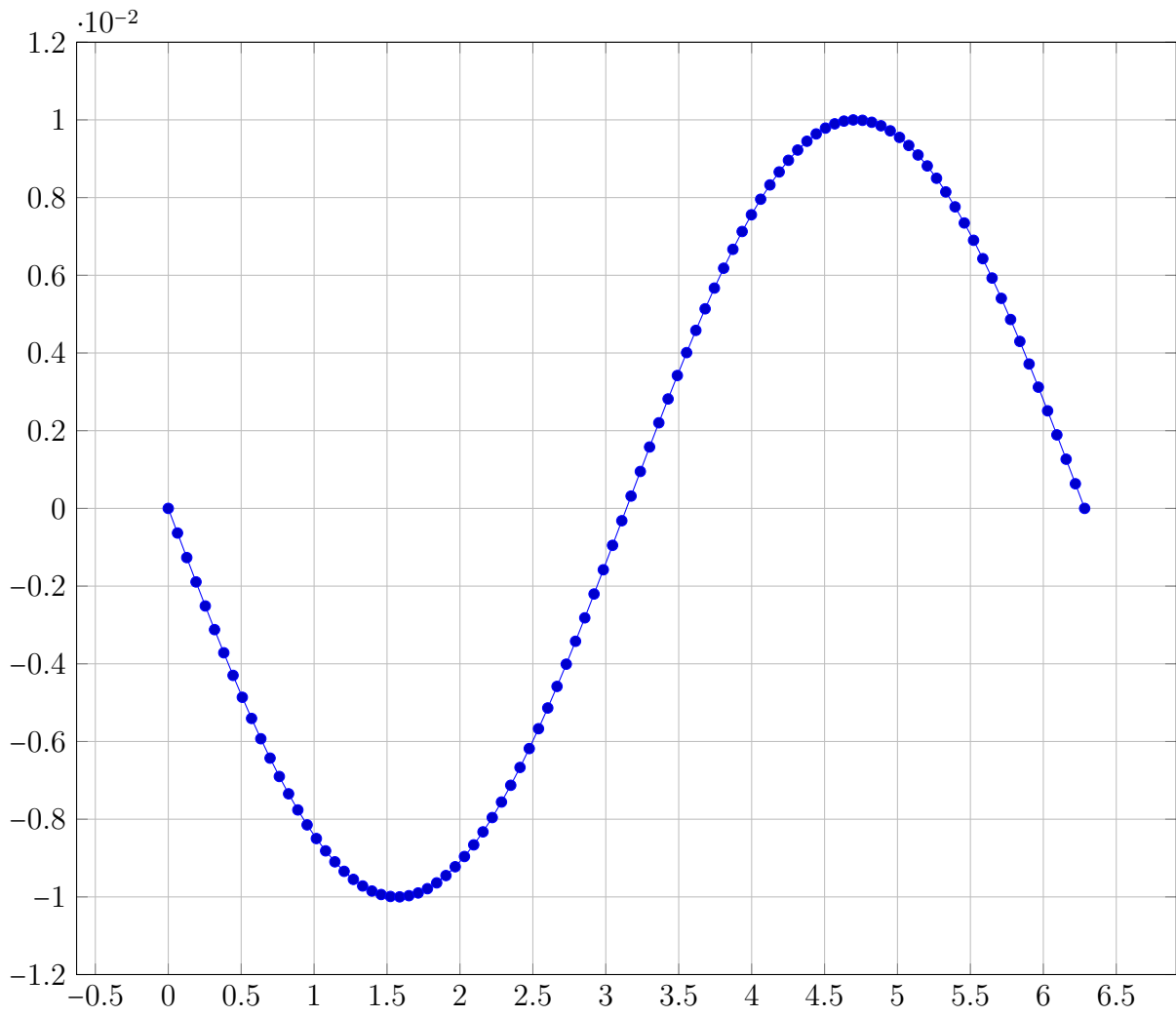
$$y_A'' = -l_1 \cdot \sin(\phi) \quad (23)$$



$$x''_{OA} = \frac{-l_1 \cdot \cos(\phi)}{2} \quad (24)$$



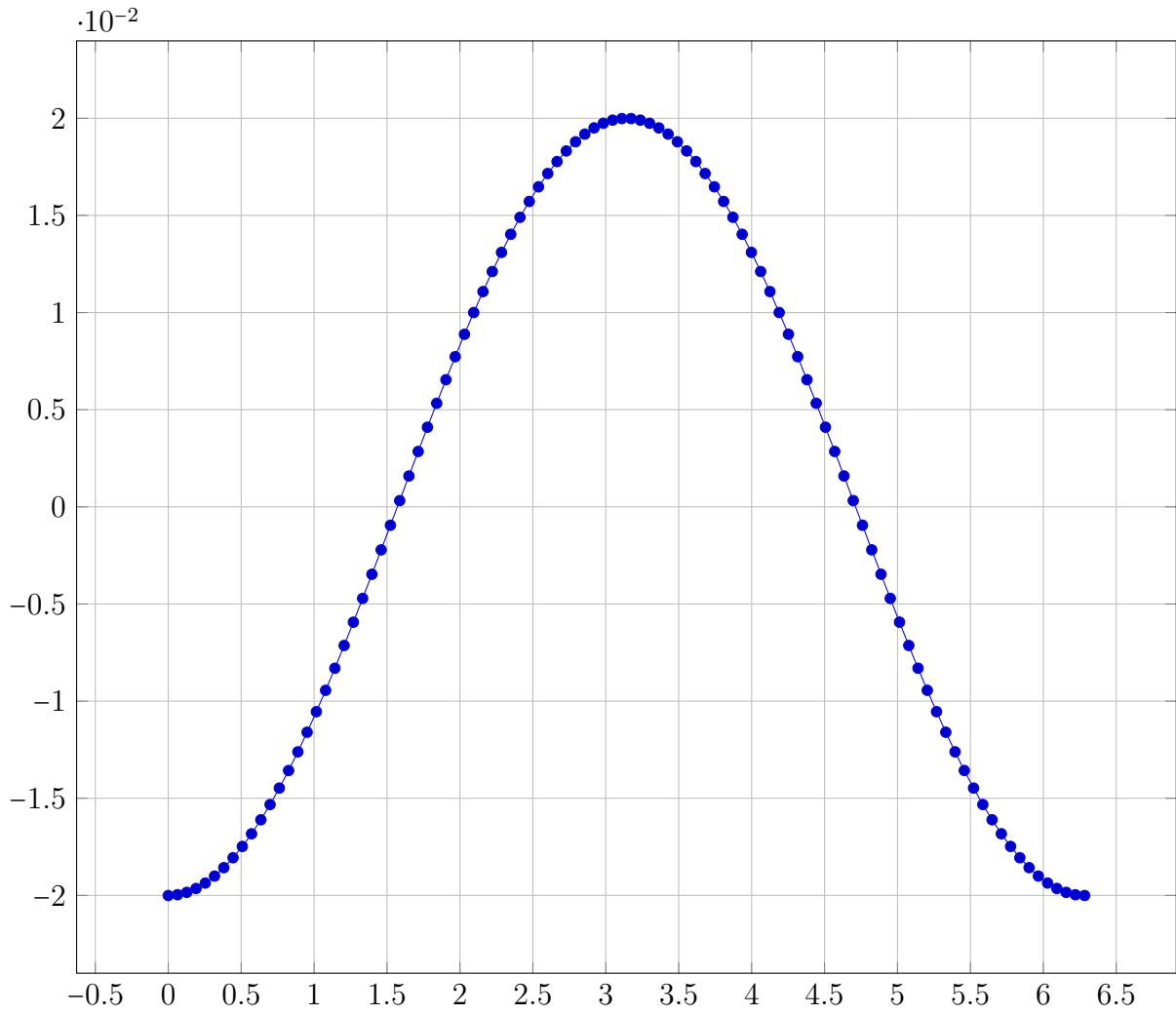
$$y''_{OA} = \frac{-l_1 \cdot \sin(\phi)}{2} \quad (25)$$



$$x''_{AB} = \frac{1}{2} \cdot \left(- \frac{l_2^3 \cdot \cos^2(x)}{4 \cdot \sqrt{1 - \frac{1}{4} \cdot (e_1 - l_2 \cdot \sin(x))^2}} - \right. \quad (26)$$

$$\left. - \frac{l_2^3 \cdot \cos^2(x) \cdot (e_1 - l_2 \cdot \sin(x))^2}{16 \cdot \left(1 - \frac{1}{4} \cdot (e_1 - l_2 \cdot \sin(x))^2\right)^{\frac{3}{2}}} - \right. \quad (27)$$

$$\left. - \frac{l_2^2 \cdot \sin(x) \cdot (e_1 - l_2 \cdot \sin(x))}{4 \cdot \sqrt{1 - \frac{1}{4} \cdot (e_1 - l_2 \cdot \sin(x))^2}} - 2 \cdot l_1 \cdot \cos(x) \right) \quad (28)$$



$$y''_{AB} = \frac{-l_1 \cdot \sin(\phi)}{2} \quad (29)$$

