Hausaufgabe Mathe

27.03.20

Aufgabe a-d

a) $f(x) = \frac{1}{2}x^2 - 3x \quad | : \frac{1}{2}$

$= x^2 - 6x$

pq Formel:

$x_{1,2} = -\frac{p}{2} \pm \sqrt{\left(\frac{p}{2}\right)^2 - q}$

$x_{1,2} = -\frac{-6}{2} \pm \sqrt{\left(\frac{-6}{2}\right)^2 - 0}$

$x_{1,2} = 3 \pm 3$

$x_1 = \underline{\underline{6}}$

$x_2 = \underline{\underline{0}}$

$\underline{\underline{A(6/0)}}$

$\underline{\underline{B(0/0)}}$

$x_s = -\frac{b}{2a}$

$= -\frac{-3}{2 \cdot \frac{1}{2}}$

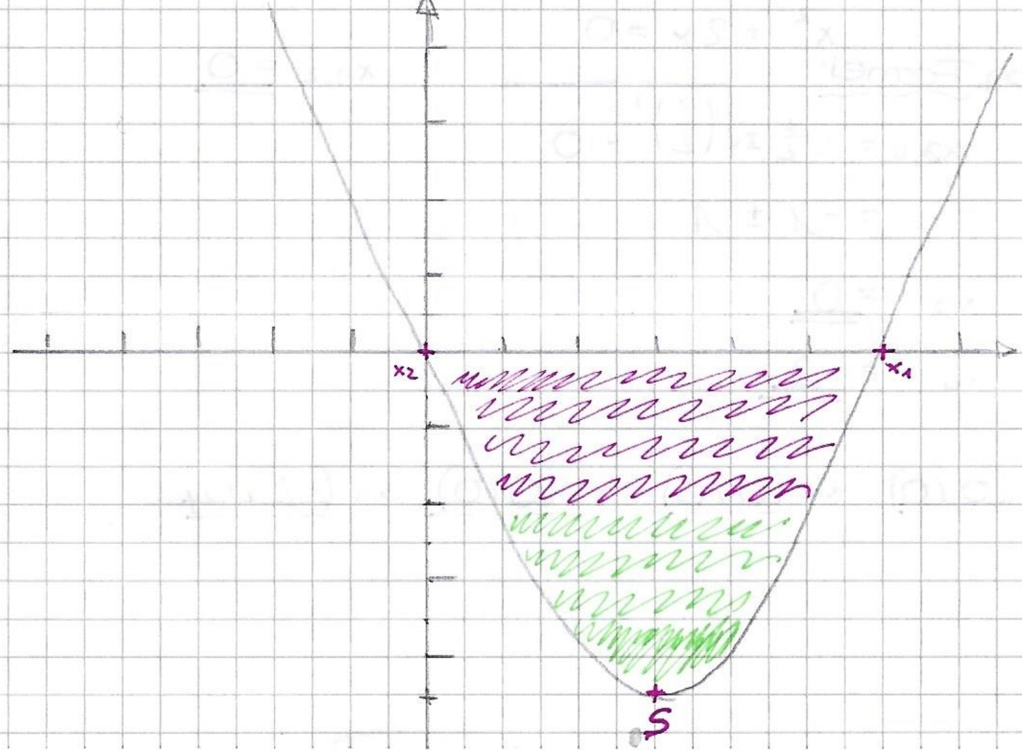
$= \underline{\underline{3}}$

$y_s = c - a x_s^2$

$= 0 - \frac{1}{2} \cdot (-3)^2$

$= \underline{\underline{-4,5}}$

$S(3/-4,5)$



$$_a\int^b f(x)\,dx = \Big[F(x)\Big]_a^b = \Big|F(b) - F(a)\Big|$$

Aufleiten:

$f(x) = (\frac{1}{2}x^2 - 3x)\,dx$

$F(x) = \frac{a}{n+1}x^{n+1}$

$F(x) = \frac{0{,}5}{2+1}x^{2+1} - \frac{3}{1+1}x^{1+1}$

$= \frac{1}{6}x^3 - \frac{3}{2}x^2$

$$_0\int^6 (\frac{1}{2}x^2 - 3x)\,dx = \Big[\frac{1}{6}x^3 - \frac{3}{2}x^2\Big]_0^6$$

$F(b) = F(6) = \frac{1}{6}\cdot 6^3 - \frac{3}{2}\cdot 6^2 = -18$

$F(a) = F(0) = \frac{1}{6}\cdot 0^3 - \frac{3}{2}\cdot 0^2 = 0$

$F(b) - F(a) = F(6) - F(0) = -18 - 0 = \underline{\underline{-18\ FE}}$

b) $f(x) = \frac{1}{2}x^4 + x^3$

$= x^2(\frac{1}{2}x^2 + x$

$f(x) = 0 \quad x^2 = 0$

$\frac{1}{2}x^2 + x = 0 \quad |:\frac{1}{2}$

$x^2 + 2x = 0$

pq-Formel: $\qquad x_{1,2} = \underline{\underline{0}}$

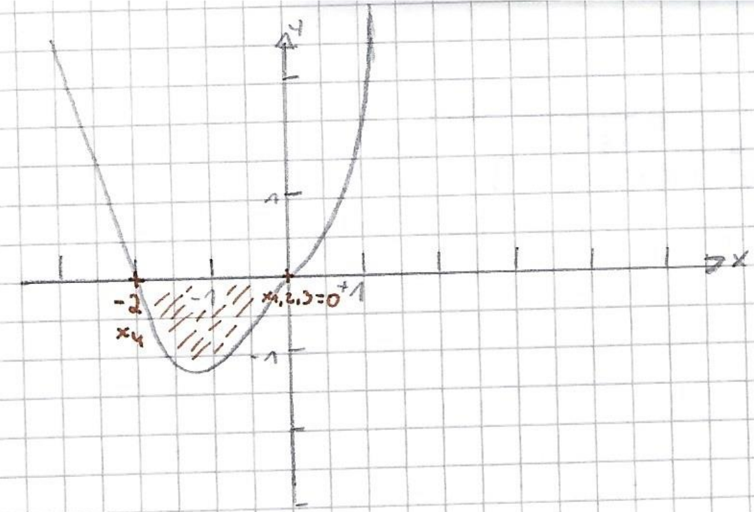
$x_{3,4} = -\frac{2}{2} \pm \sqrt{\left(\frac{2}{2}\right)^2 - 0}$

$= -1 \pm 1$

$x_3 = \underline{\underline{0}}$

$x_4 = \underline{\underline{-2}}$

$x_1\ \underline{\underline{(0|0)}} \quad x_2\ \underline{\underline{(0|0)}} \quad x_3\ \underline{\underline{(0|0)}} \quad x_4\ \underline{\underline{(-2|0)}}$



$$\int_a^b f(x)\,dx = \Big[F(x)\Big]_a^b = \big|F(b) - F(a)\big|$$

$$\int_{-2}^{0} \left(\frac{1}{2}x^{4} + x^3\right) = \Big[0{,}1x^5 + 0{,}25x^4\Big]_{-2}^{0}$$

Aufleiten:

$f(x) = \frac{1}{2}x^4 + x^3$

$F(x) = \frac{a}{n+1}x^{n+1}$

$F(x) = \frac{0{,}5}{4+1}x^{4+1} + \frac{1}{3+1}x^{3+1}$

$= 0{,}1x^5 + 0{,}25x^4$

$F(b) = F(0) = 0{,}1 \cdot 0^5 + 0{,}25 \cdot 0^4 = 0$

$F(a) = F(-2) = 0{,}1 \cdot (-2)^5 + 0{,}25 \cdot (-2)^4 = -0{,}8$

$F(b) - F(a) = F(0) - F(-2) = 0 - (-0{,}8) = \underline{\underline{0{,}8}}$ FE

c) $f(x) = -x^4 + 6x^3 - 9x^2$

$= x^2(-x^2 + 6x - 9)$

$f(x) = 0 \qquad x^2 = 0 \Rightarrow x_{1,2} = 0$

$-x^2 + 6x - 9 = 0 \quad | \cdot (-1)$

$x^2 - 6x + 9 = 0$

pq-Formel

$$x_{3,4} = -\frac{-6}{2} \pm \sqrt{\left(\frac{-6}{2}\right)^2 - 9}$$

$$x_{3,4} = 3 \pm 0$$

$$x_3 = \underline{\underline{3}}$$

$$x_4 = \underline{\underline{3}}$$

$$x_{3,4} = 3$$

$x_1 = (0/0)$ $x_2 = (0/0)$ $x_3 = (3/0)$ $x_4 = (3/0)$

$$\int_0^3 (-x^4 + 6x^3 - 9x^2)\,dx = \left[-\frac{1}{5}x^5 + \frac{3}{2}x^4 - 3x^3\right]_0^3$$

Aufleiten.

$$f(x) = (-x^4 + 6x^3 - 9x^2)$$

$$F(x) = \frac{-1}{4+1}x^{4+1} + \frac{6}{3+1}x^{3+1} - \frac{9}{2+1}x^{2+1}$$

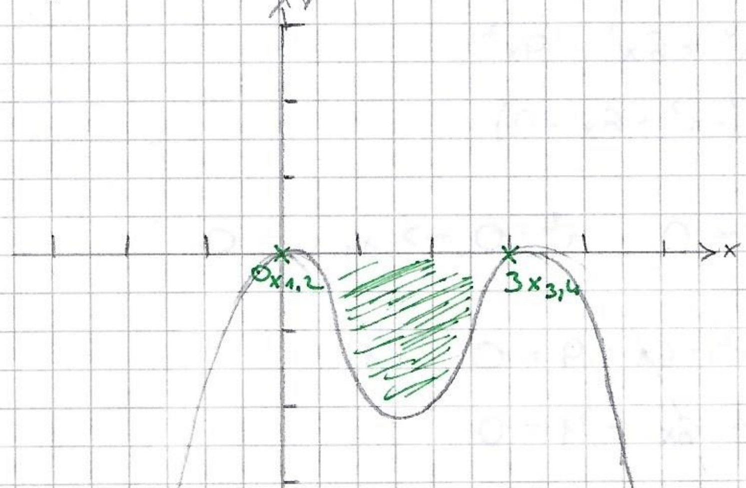
$$= -\frac{1}{5}x^5 + \frac{3}{2}x^4 - 3x^3$$

$$A = F(b) - F(a)$$

$$F(b) = F(3) = -\frac{1}{5}\cdot 3^5 + \frac{3}{2}\cdot 3^4 - 3\cdot 3^3 = -8{,}1$$

$$F(a) = F(0) = -\frac{1}{5}\cdot 0^5 + \frac{3}{2}\cdot 0^4 - 3\cdot 0^3 = 0$$

$$F(b) - F(a) = F(3) - F(0) = -8{,}1 - 0 = \underline{\underline{-8{,}1}}\ \text{FE}$$



d) $f(x) = \frac{1}{2}x^2 - \frac{1}{2}x - 3 \quad | : \frac{1}{2}$

$= x^2 - x - 6$

pq-Formel

$x_{1,2} = -\frac{-1}{2} \pm \sqrt{\left(\frac{-1}{2}\right)^2 + 6}$

$= \frac{1}{2} \pm 2.5$

$x_1 = \underline{\underline{3}}$

$x_2 = \underline{\underline{-2}}$

$\int_{-2}^{3} \left(\frac{1}{2}x^2 - \frac{1}{2}x - 3\right) dx = \left[\frac{1}{6}x^3 - \frac{1}{4}x^2 - 3x\right]_{-2}^{3}$

Aufleiten:

$f(x) = \frac{1}{2}x^2 - \frac{1}{2}x - 3$

$F(x) = \frac{1}{6}x^3 - \frac{1}{4}x^2 - 3x$

$A = F(b) - F(a)$

$F(b) = F(3) = \frac{1}{6} \cdot 3^3 - \frac{1}{4} \cdot 3^2 - 3 \cdot 3 = -6{,}75$

$F(a) = F(-2) = \frac{1}{6} \cdot (-2)^3 - \frac{1}{4} \cdot (-2)^2 - 3 \cdot (-2) = 3{,}67$

$F(b) - F(a) = F(3) - F(-2) = -6{,}75 - 3{,}67 = \underline{\underline{-10{,}42}}$ FE