Hausaufgabe - Woche 2 24.05.2024

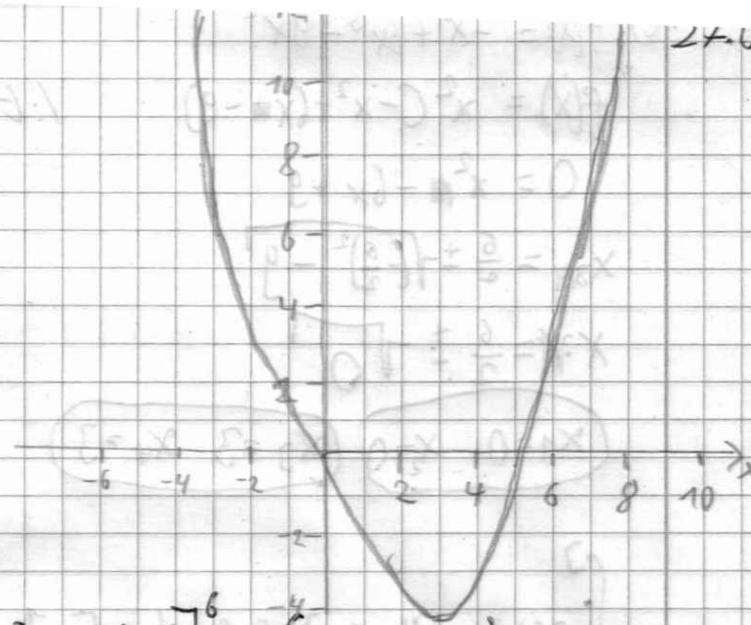
a) $f(x) = \frac{1}{2}x^2 - 3x$

$f(x) = \frac{1}{2}(x^2 - 6x + 0)$

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

$x_1 = 3 + 3 = \underline{\underline{6}}$

$x_2 = 3 - 3 = \underline{\underline{0}}$



$$\int_0^6 f(x) = \frac{1}{2}x^2 - 3x \, dx = \left[\frac{1}{6}x^3 - 1\frac{1}{2}x^2\right]_0^6 \Rightarrow \left(\frac{1}{6}\cdot 6^3 - 1\frac{1}{2}\cdot 6^2\right) - \left(\frac{1}{6}\cdot 0^3 - 1\frac{1}{2}\cdot 0^2\right)$$

$= -18 - 0$

$= \underline{\underline{-18 \text{ FE}}}$

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

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

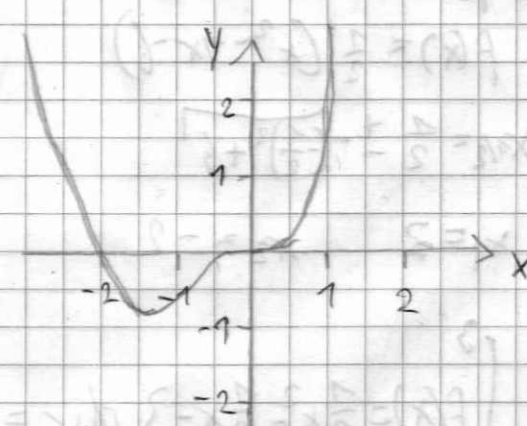
$0 = \frac{1}{2}x + 1 \quad / -1$

$-1 = \frac{1}{2}x \quad / : \frac{1}{2}$

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

$x_{1-3} = \underline{\underline{0}}$

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



$$\int_{-2}^{0} f(x) = \frac{1}{2}x^4 + x^3 \, dx = \left[\frac{1}{10}x^5 + \frac{1}{4}x^4\right]_{-2}^{0} \Rightarrow \left(\frac{1}{10}\cdot 0^5 + \frac{1}{4}\cdot 0^4\right) - \left(\frac{1}{10}\cdot(-2)^5 + \frac{1}{4}\cdot(-2)^4\right)$$

$= 0 + 3{,}6$

$= \underline{\underline{3{,}6 \text{ FE}}}$