Buch S. 273

Nr. 7 a) $f(x) = \frac{3}{4}x^2 + 1 \quad \Rightarrow \quad F(x) = \frac{1}{4}x^3 + x$

$A = \int_1^3 f(x)\,dx = F(b) - F(a) = [F(x)]_1^3$

$F(3) = \frac{1}{4} \cdot 3^3 + 3 = \frac{27}{4} + 3 = 9\frac{3}{4}$

$F(1) = \frac{1}{4} \cdot 1^3 + 1 = 1\frac{1}{4}$

$F(3) - F(1) = 8\frac{1}{2}$ FE

b) $g(x) = -x^2 - 2x + 4 \quad \Rightarrow \quad G(x) = -\frac{1}{3}x^3 - x^2 + 4x$

$B = \int_{-2}^1 g(x)\,dx = [G(x)]_{-2}^1$

$G(1) = -\frac{1}{3} \cdot 1^3 - 1^2 + 4 = 2\frac{2}{3}$

$G(-2) = -\frac{1}{3} \cdot -2^3 + 2^2 - 4 = -4\frac{2}{3} = -2\frac{1}{3}$

$-8 \quad +4$

$G(1) - G(-2) = 5$ FE

c) $h(x) = -x^4 + 3x^2 + 4 \quad \Rightarrow \quad H(x) = -\frac{1}{5}x^5 + x^3 + 4x$

$C = \int_{-2}^2 h(x)\,dx = [H(x)]_{-2}^2$

$H(2) = -\frac{1}{5} \cdot 2^5 + 2^3 + 8 = -\frac{32}{5} + 16 = 10 - \frac{2}{5}$

$H(-2) = -\frac{1}{5} \cdot -2^5 - 2^3 - 8 = \frac{32}{5} - 16 = -10 + \frac{2}{5}$

$H(2) - H(-2) = 20\frac{4}{5}$ FE

$f(x) = -x^2 + 8x$

$= x(-x + 8)$ $\quad x_1 = 0$ $\quad x_2 = 8$

$f'(x) = -2x + 8$

$0 = -2x + 8 \quad | : -2$

$= x - 4$ $\quad x_E = +4$

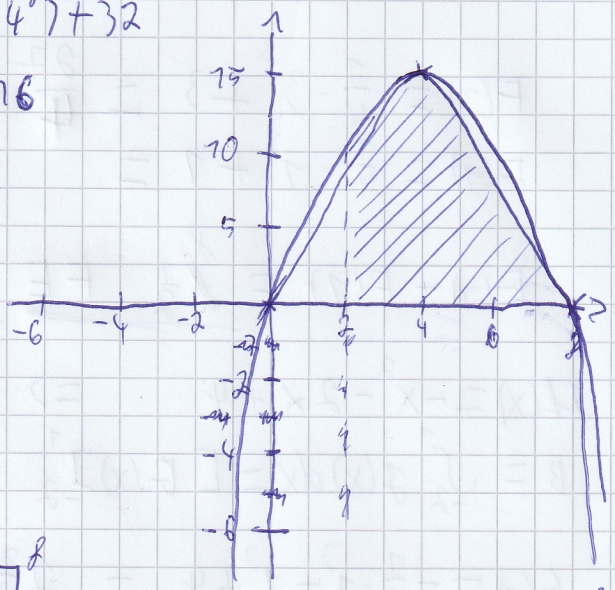
~~$f''(x) = -2$ $\quad x_W = -2$~~

$f(x_E) = -(4^2) + 32$

$= 76$

~~$f(x_W) = -(-2^2) - 76$~~

~~$= -20$~~



$A = \int_2^8 f(x)\,dx \Rightarrow [F(x)]_2^8$

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

$F(8) = -\frac{1}{3} \cdot 8^3 + 4 \cdot 8^2 = -\frac{512}{3} + \frac{256}{1} \cdot 8 = -170\frac{2}{3} + \frac{256}{1} \cdot 8 = 86\frac{1}{3}$

$F(2) = -\frac{1}{3} \cdot 2^3 + 4 \cdot 2^2 = -\frac{8}{3} + 16 = -2\frac{2}{3} + 16 = 13\frac{1}{3}$

$F(8) - F(2) = \underline{73\ \text{FE}}$

Nr. 3 a) $f(x) = -x + 5 \Rightarrow F(x) = -\frac{1}{2}x^2 + 5x$

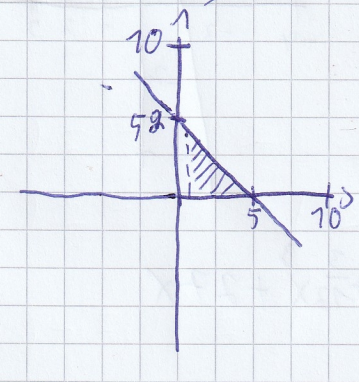
Faulheit liegt, skizzen aus der Gebra Gehlaut!

$A = \int_1^5 f(x)\,dx = [F(x)]_1^5$

$F(5) = -\frac{1}{2} \cdot 5^2 + 25 = -2\frac{25}{2} + 25 = 12{,}5$

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

$F(5) - F(1) = 8\,FE$



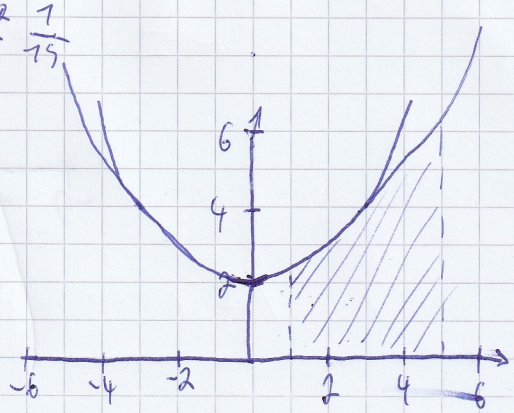
b) $f(x) = 0{,}2x^2 + 2 \Rightarrow F(x) = \frac{0{,}2}{3}x^3 + 2x$

A = (siehe Aufgabe a))

$F(5) = \frac{1}{15} \cdot 5^3 + 10 = \frac{125}{15} + 10 = 18\frac{1}{3} = 18\frac{5}{15}$

$F(1) = \frac{1}{15} \cdot 1^3 + 2 = 2\frac{1}{15}$

$F(5) - F(1) = 16\frac{4}{15}$ FE



c)

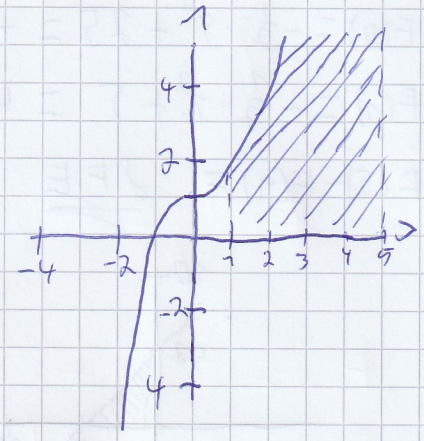
c) $f(x) = x^3 + 1 \Rightarrow F(x) = \frac{1}{4}x^4 + 1x$

A = (siehe Aufgabe a))

$F(5) = \frac{1}{4} \cdot 5^4 + 5 = \frac{625}{4} + 5 = 156\frac{1}{4}$

$F(1) = \frac{1}{4} \cdot 1^4 + 1 = 1\frac{1}{4}$

$F(5) - F(1) = 155$ FE



d) $f(x) = -\frac{3}{4}x^2 + 27 \Rightarrow F(x) = -\frac{3}{12}x^3 + 27x$

$A = 11$

$F(5) = -\frac{1}{4} \cdot 5^3 + 135 = -6\frac{1}{4} + 135 = 128\frac{3}{4}$

$F(1) = -\frac{1}{4} \cdot 1^3 + 27 = 26\frac{3}{4}$

$F(5) - F(1) = 102$ FE