Aufgabe 1

a) $\int_1^3 \frac{3}{4}x^2+1 \, dx = \left[\frac{3}{12}x^3+x\right]_1^3 = \left[\frac{1}{4}x^3+x\right]_1^3$

$A_0 = \left(\frac{1}{4}\cdot 3^3+3\right) - \left(\frac{1}{4}\cdot 1^2+1\right)$

$= 8{,}5$

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

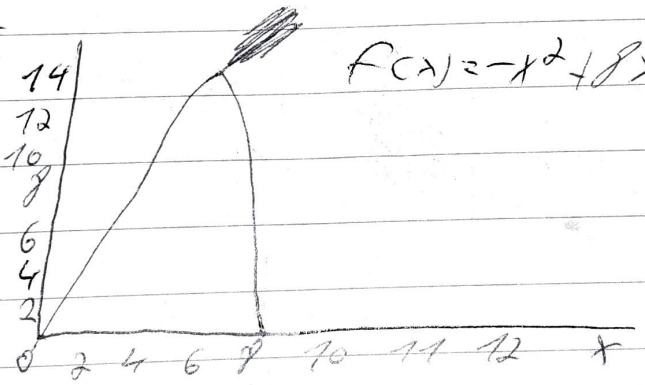
$A_0 = \left(-\frac{1}{3}\cdot 1^3-1^2+4\cdot 1\right) - \left(-\frac{1}{3}\cdot(-2)^2+4\cdot(-2)\right)$

$= 4$

c) $\int_{-2}^{2} -x^4+3x^2+4 \, dx = \left[-\frac{1}{5}x^5+x^3+4x\right]_{-2}^{2}$

$A_0 = \left(-\frac{1}{5}\cdot 2^5+2^3+4\cdot 2\right) - \left(-\frac{1}{5}\cdot(-2)^5+(-2)^3+4\cdot(-2)\right) = 18$

Aufgabe 2



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

$\int_2^8 -x^2+8x \, dx = \left[-\frac{1}{3}+4x^2\right]_2^8$

$A_0 = \left(-\frac{1}{3}\cdot 8^3+4\cdot 8^3\right) - \left(-\frac{1}{3}\cdot 2^3+4\cdot 2^2\right)$

$= \left(-\frac{1}{3}\cdot 512+4\cdot 64\right) - \left(-\frac{8}{3}+4\cdot 4\right)$

$= \left(-\frac{512}{3}+256\right) - \left(-\frac{8}{3}+16\right)$

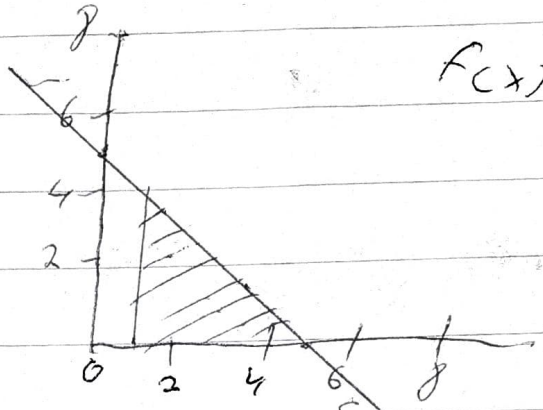
$= -\frac{512}{3}+256-\frac{8}{3}-16$

$= -\frac{512}{3}-\frac{8}{3}+256-76$

$= \frac{520}{3}+240 = -173{,}3+240 = 66$

Aufgabe 3

a) $A = \frac{4 \cdot 4}{2} = 8$

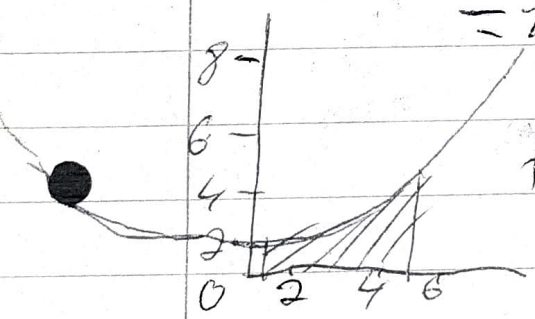


$f(x) = -x + 5$

b) $\int_1^5 0{,}2x^2 + 2 \, dx = \left[\frac{0{,}2}{3}x^3 + 2x\right]_1^5$

$A_0 = \frac{0{,}2}{3} \cdot 5^3 + 2 \cdot 5 - \left(\frac{0{,}2}{3} \cdot 1^3 + 2 \cdot 1\right)$

$= 16{,}26$

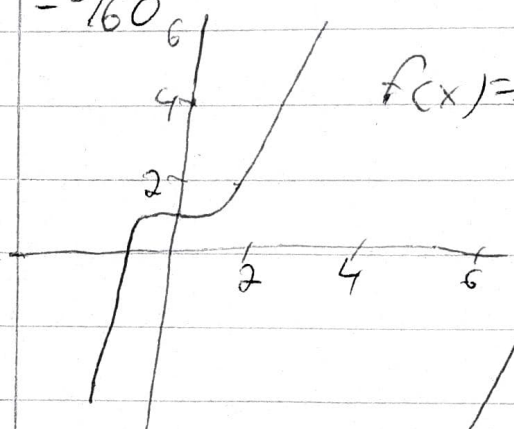


$f(x) = 0{,}2x^2 + 2$

c) $\int_1^5 x^2 + 1 \, dx = \left[\frac{1}{4}x^4 + x\right]_1^5$

$A_0 = \frac{1}{4} \cdot 5^4 + 5 - \frac{1}{4} \cdot 1^4 + 1$

$= 160$



$f(x) = x^3 + 1$

d) $\int_1^5 -\frac{3}{4}x^2 + 27 \, dx = \left[\frac{-3}{12}x^3 + 27x\right]_1^5 = \left[\frac{1}{4}x^3 + 27x\right]_1^5$

$A_0 = \left(\frac{1}{4} \cdot 5^3 + 27 \cdot 5\right] - \left(\frac{1}{4} \cdot 1^3 + 27 \cdot 1\right)$

$= 134$