S. 223

2) a) $A = \int_{-2}^{2} f(x) - g(x)\,dx$

b) $A = \int_{a}^{0} f(x) - g(x)\,dx + \int_{0}^{b} g(x) - f(x)\,dx$

c) $A = 2 \cdot \left(\int_{0}^{1} f(x)\,dx + \int_{1}^{b} f(x) - g(x)\,dx \right)$ (Symmetrie vorausgesetzt)

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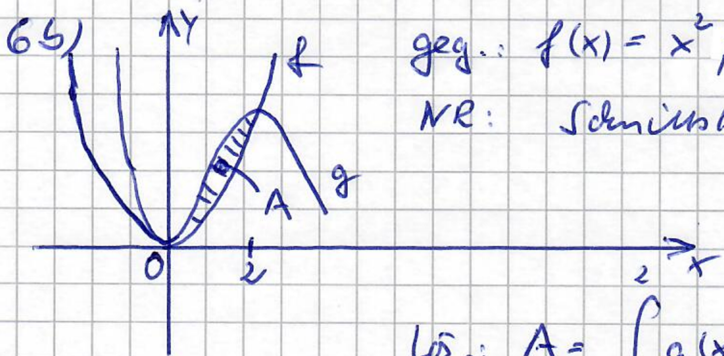
3) a) $A = A_1 + A_2$

b) $A = A_6 + A_5$

c) $A = A_2 + A_3$

6b)

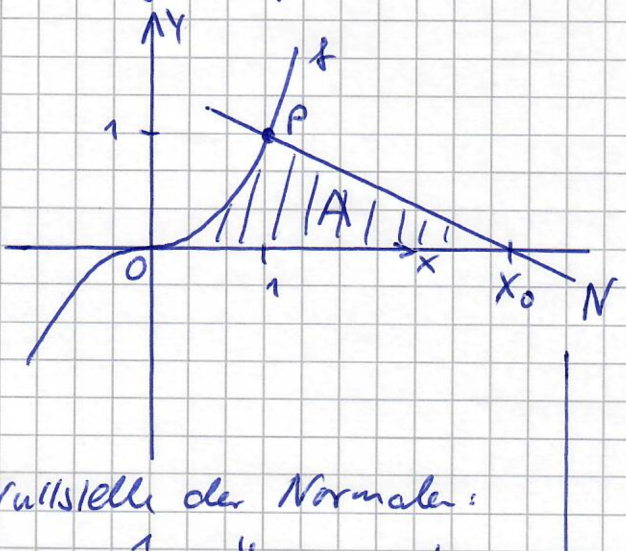


geg.: $f(x) = x^2$; $g(x) = -x^3 + 3x^2$

NR: Schnittstellen: $x_{S_1} = 0$; $x_{S_2} = 2$

Lös.: $A = \int_{0}^{2} g(x) - f(x) = \underline{\underline{1\frac{1}{3}\text{ FE}}}$

9b) geg.: $f(x) = x^3$; $P(1|1)$ ges.: A



NR: Normale N in P

Anstieg Tangente in P:

$f'(x) = 3x^2 \wedge m = f'(1) = 3$

Anstieg Normale in P:

$\bar{m} = -\frac{1}{m} = \underline{\underline{-\frac{1}{3}}}$

$\wedge$ Normalengleichung:

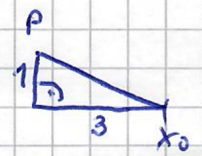
$y = -\frac{1}{3}x + n$

$P \rightarrow 1 = -\frac{1}{3} \cdot 1 + n \wedge n = \frac{4}{3}$

$\wedge \underline{\underline{y = -\frac{1}{3}x + \frac{4}{3}}}$

Nullstelle der Normalen:

$0 = -\frac{1}{3}x + \frac{4}{3} \wedge \underline{\underline{x_0 = 4}}$

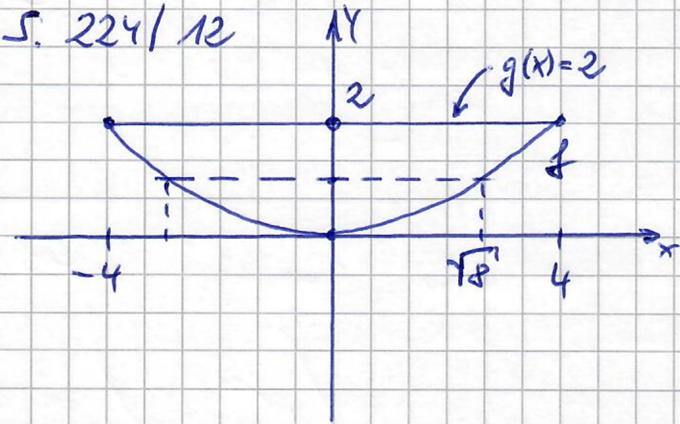
$$A = \int_0^1 f(x)\,dx +$$ 

$$A = \int_0^1 x^3\,dx + \frac{1}{2}\cdot 3 \cdot 1$$

$$A = \left[\frac{1}{4}x^4\right]_0^1 + \frac{3}{2}$$

$$A = \frac{1}{4} - 0 + \frac{3}{2} = \underline{\underline{\frac{7}{4}\,FE}}$$

S. 224/12



geg.: $f(x) = \frac{1}{8}x^2$; $1 = 1m$

ges.: a) A (Querschnittsfläche)

Lös.: $A = 2\cdot\int_0^4 g(x) - f(x)\,dx$

$$A = 2\cdot\int_0^4 2 - \frac{1}{8}x^2\,dx = \underline{\underline{\frac{32}{3}m^2}}$$

TR

ges.:

b) geg.: Kanallänge: 2000 m

ges.: Volumen

Lös.: $V = A \cdot 2000\,m = \frac{32}{3}m^2 \cdot 2000\,m = \underline{\underline{21333,\bar{3}\,m^3}}$

ges.:

c) geg.: halbe Höhe $\curvearrowright$ neue Intervallgrenzen: $-\sqrt{8} .. \sqrt{8}$

$\left(1 = \frac{1}{8}x^2 \curvearrowright x_{1,2} = \pm\sqrt{8}\right)$

Lös.: $A = 2\cdot\int_0^{\sqrt{8}} 1 - \frac{1}{8}x^2\,dx \approx \underline{3,77\,m^2}$

$V = 3,77\,m^2 \cdot 2000\,m \approx \underline{7542,5\,m^3}$

$\curvearrowright$ $7542,5 = x\%$
$21333,3 = 100\%$ $\curvearrowright$ $\underline{\underline{x \approx 35,4\%}}$ bei halber Füllung