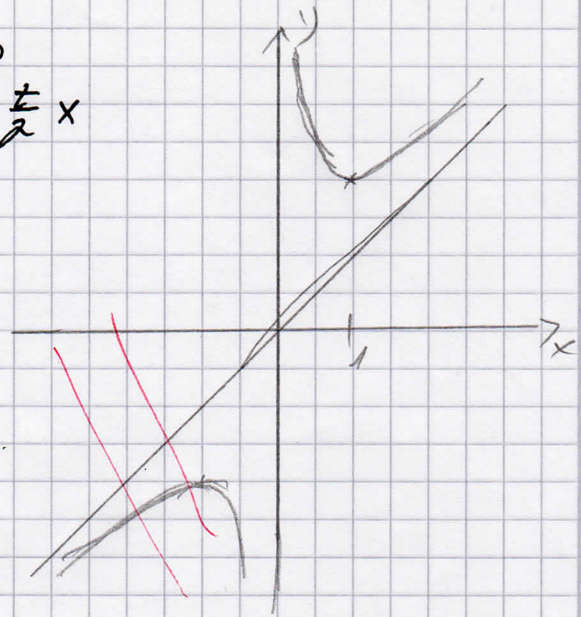
A4 Lösungen

$$f_t(x) = \frac{tx^3+2}{2x^2} = \frac{tx^3}{2x^2} + \frac{2}{2x^2} = \frac{t}{2}x + \frac{1}{x^2}$$

$$f'_t(x) = \frac{t}{2} - 2x^{-3} = \frac{t}{2} - \frac{2}{x^3} \qquad \mathbb{D} = \mathbb{R}\setminus\{0\}$$

a) senkrechte As. $x=0$
schiefe As. $y = \frac{t}{2}x$



b) Nullstelle

$tx^3+2=0$

$x^3 = -\frac{2}{t}$

$N\left(-\sqrt[3]{\frac{2}{t}}\,\middle|\,0\right)$

$f'\left(-\sqrt[3]{\frac{2}{t}}\right) = \frac{t}{2} - \frac{2}{-\frac{2}{t}} = \frac{3}{2}t$

$\frac{3}{2}t \overset{!}{=} 1 \Rightarrow \underline{\underline{t = \frac{2}{3}}}$

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

$\lim\limits_{b\to\infty} -\frac{1}{b}+2 = \underline{\underline{2}}$

d) $$V = \pi \int_{0,5}^{3}\left(\left(x+\frac{1}{x^2}\right)^2 - \left(\sqrt{\frac{2}{x}}\right)^2\right)dx \overset{GTR}{=} 11,61\pi$$

$\approx 36,48$ VE

e) $$\bar{m} = \frac{1}{2}\int_{1}^{3}\left(\frac{2x^3+2}{2x^2}\right)dx \overset{GTR}{=} \frac{7}{3}$$

f) $f'_2(-1) = 1 - \frac{2}{-1} = 3 \qquad N_2(-1|0)$

$w_t = 3(x+1) = 3x+3 \;; \quad 3x+3 = x + \frac{1}{x^2}$

$2x^3+3x^2-1=0 \;; \quad (2x^3+3x^2-1):(x+1) = 2x^2+x-1$

$\Rightarrow x_{2/3} = -\frac{1}{4} \pm \frac{3}{4} \qquad \underline{\underline{x_2 = \frac{1}{2}}} \qquad x_3 = x_1 = -1$