Übungen in Analysis ◇ Exercices en analyse ◇ T. I1 ◇ I / 10

Probl. 1 Skizzen? • *Esquisses?*

(a) $f(x) = x^2 + \sin(x)$

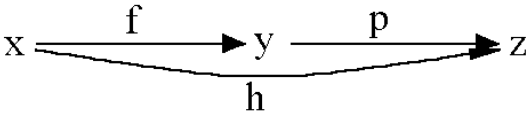
(b) $f(x) = [x^2] + 1$

(c) $f(x) = \sin([x^2 + 1]) - 1$

Probl. 2 $x = 4 + \cfrac{4}{4 + \cfrac{4}{4 + \cfrac{4}{\ddots}}} \stackrel{?}{=} \dfrac{p}{q}, \;\; p, q \in \mathbb{N}$

$x = 5 + \cfrac{3}{3 + \cfrac{3}{3 + \cfrac{3}{\ddots}}} \stackrel{?}{=} \dfrac{r}{s}, \quad = ?$

Probl. 3



$f(x) = \arccos(x) = y$
$h(x) = p(f(x)) = p(y) = y^2 - 2\,y + 2 = z$
$h(x) = (p \circ f)(x))$

(a) $h(x) \rightsquigarrow$ Diagramm?
$h(x) \rightsquigarrow$ • *Diagramme?*

(b) $D_h = ?, \;\; W_h = ?$

(c) $h(0) = ?, \;\; h(1) = ?$

Probl. 4 $f(x) = x^2 + x + \dfrac{1}{4}, \;\; g(x) = x^2 - x$

(a) Nullstellen von $h(x) = f(x) \cdot g(x)$? • *Zéros de* $h(x) = f(x) \cdot g(x)$*?*

(b) $u(x) = \dfrac{1}{f(x) - g(x)} \rightsquigarrow$ i. Diagramm? • *Diagramme?*
ii. Pole? • *Pôles?*

Probl. 5 $h(x) = \dfrac{f(x)}{g(x)} + x$
$f(x), g(x) \rightsquigarrow$ Probl. 4

(a) Diagramm? • *Diagramme?*

(b) Verhalten für grosse $|x|$?
• *Comportement pour des* $|x|$ *qui sont grands?*

Probl. 6 $f(x) = e^{-x^2}, \;\; g(x) = x$

(a) Diagramm? • *Diagramme?*

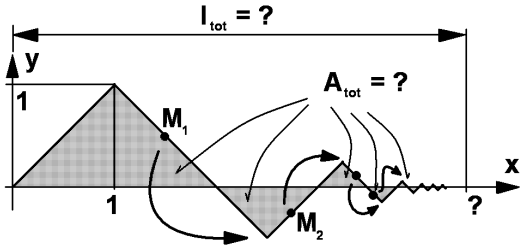
(b) $f(x) = g(x) \rightsquigarrow \;\; x \approx ?$

(c) $m \leq f(x) \leq M \rightsquigarrow \;\; m = ?, \;\; M = ?$

(d) $f(0) = ?, \;\; f(ln(e)) = ?, \;\; f(1) = ?$

Probl. 7 $3^x = 2^{2\,x} \cdot e^3 \cdot 3^{-2\,x} \rightsquigarrow \;\; x = ?$

Probl. 8 $A_{tot} = ?,\ \ l_{tot} = ?$



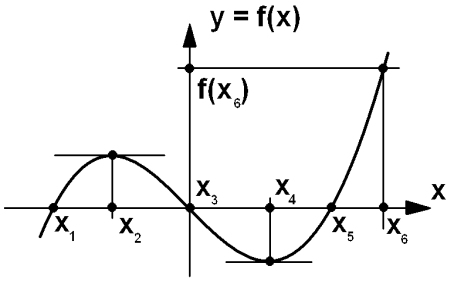
Probl. 9 $\lim\limits_{n\to\infty} \dfrac{n\cdot\cos(2\,n) - \sin(n^2) + 8\,n^2 - 4\,n + 5}{2\,n^2 + 4\,n - 5\,\sin(n)} = ?$

Probl. 10 $f(x) = a\cdot(x-x_1)\,(x-x_3)\,(x-x_5)$

$x_1 = -2,\ \ x_3 = 0,\ \ x_5 = 2$

$x_6 = 4,\ \ f(x_6) = 48$

$x_2 = ?\ ,\ \ x = 4 = ?$



Probl. 11 $\langle a_n\rangle = \langle(3 + \dfrac{3}{2^2} + \dfrac{3}{2^4} + \dfrac{3}{2^6}\ldots)\cdot(\dfrac{5}{2} + \dfrac{5}{2^3} + \dfrac{5}{2^5} + \ldots)\rangle \rightsquigarrow\ \ a_n \to ?$

Probl. 12 $\langle a_n\rangle = \sum\limits_{k=1}^{n}(\dfrac{1}{2^k} - \dfrac{1}{3^k}) \rightsquigarrow\ \ a_n \to ?$