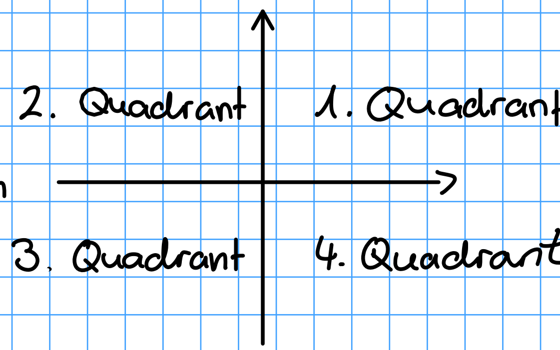
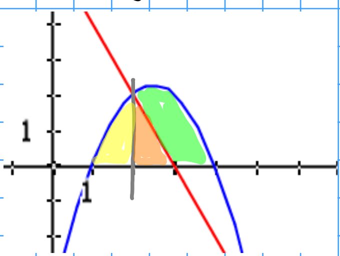
Repetition Integralrechnung

6. April 2017

http://oriesen.ch → Maturarepetition



Aufgabe 1



1. Schnittpunkt bestimmen

$$-x^2 + 5x - 4 = 6 - 2x$$

$$0 = x^2 - 7x + 10$$

$$0 = (x-2)(x-5) \qquad \underline{x_1 = 2} \qquad x_2 = 5$$

2. Nullstellen von $f(x)$

$$-x^2 + 5x - 4 = 0$$

$$x^2 - 5x + 4 = (x-1)(x-4) = 0 \qquad x_3 = 1 \quad x_4 = 4$$

3. Fläche

$$\int_{x_3}^{x_1} f(x)\,dx = \int_1^2 -x^2 + 5x - 4\,dx = \left[-\frac{1}{3}x^3 + \frac{5}{2}x^2 - 4x + c\right]_1^2$$

$$= -\frac{1}{3}\cdot 2^3 + \frac{5}{2}2^2 - 4\cdot 2 + \frac{1}{3}\cdot 1^3 - \frac{5}{2}\cdot 1^2 + 4\cdot 1$$

$$= -\frac{8}{3} + \frac{30}{3} - \frac{24}{3} + \frac{1}{3} - \frac{5}{2} + 4 = \ldots$$

$f(x):=-x^2+5\cdot x-4$	Done
$g(x):=6-2\cdot x$	Done
$\int_1^2 f(x)\,dx$	$\frac{7}{6}$

4. berechnen

Dreiecksfläche

$$\frac{f_1(2)\cdot 1}{2} = \frac{2}{2} = 1$$

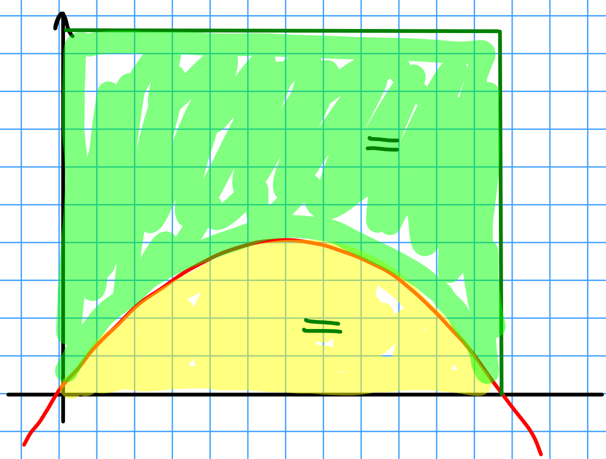
1. Fläche : $\frac{7}{6} + \frac{6}{6} = \frac{13}{6}$

Gesamtfläche: $\int_1^4 f_2(x)\,dx$ $\quad \int_1^4 f(x)\,dx \qquad \frac{9}{2}$

2. Fläche: $\frac{9}{2} - \frac{13}{6} = \frac{27-13}{6} = \frac{14}{6}$

Verhältnis: $\frac{\frac{13}{6}}{\frac{14}{6}} = \underline{\underline{\frac{13}{14}}}$

Aufgabe 3



HA: Blatt fertig lösen

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11. April 2017

+ Alte Maturaprüfungen auf https://cloud.ksz.ch
+ Beweise: Vor den Frühlingsferien!
+ Fragen zu den Integralrechnungs-Aufgaben

Mo 24.4. um: 076 543 83 47

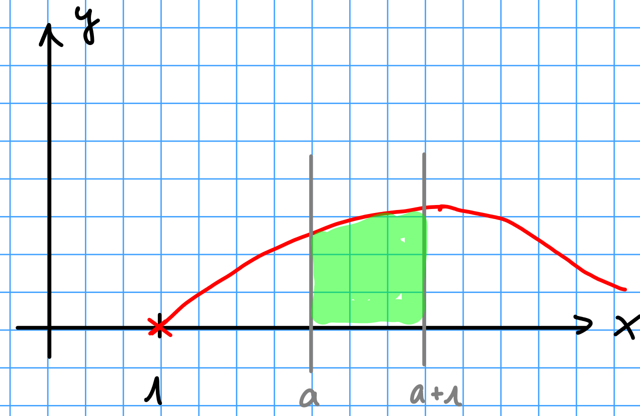
$8^{30} - 10^{30}$: Vektorgeometrie

$11^{00} - 12^{00}$
: Analysis
$13^{00} - 14^{00}$

$14^{30} - 16^{30}$: Stochastik

Aufgabe 4 (Repetitionsblatt)

$$f(x) = \frac{x-1}{x^2}$$



soll möglichst gross werden.

$$= \int_a^{a+1} f(x)\,dx$$

$$(x-1)\cdot x^{-2} = x^1 x^{-2} - x^{-2} = x^{-1} - x^{-2}$$

$$= \int_a^{a+1} \frac{x-1}{x^2}\,dx = \Big[\ln(x) + x^{-1}\Big]_a^{a+1} = \ln(a+1) + \frac{1}{a+1}$$

$$- \ln(a) - \frac{1}{a}$$

$$(a+1)^{-1}$$

$$Fl(a) = \ln(a+1) + \frac{1}{a+1} - \ln(a) - \frac{1}{a}$$

$$Fl'(a) = \frac{1}{a+1} - (a+1)^{-2}\cdot 1 - \frac{1}{a} + a^{-2}$$

$$= \frac{1}{a+1} - \frac{1}{(a+1)^2} - \frac{1}{a} + \frac{1}{a^2} = 0 \qquad \Big|\cdot a^2\cdot(a+1)^2$$

$$(a+1)a^2 - a^2 - a(a+1)^2 + (a+1)^2 = 0$$

$$\cancel{a^3} + \cancel{a^2} - \cancel{a^2} - \cancel{a^3} - 2a^2 - a + a^2 + 2a + 1 = 0$$

$$-a^2 + a + 1 = 0$$

$$a^2 - a - 1 = 0$$

$$f(x) := \frac{x-1}{x^2} \qquad \textit{Done}$$

$$fl(a) := \int_a^{a+1} f(x)\,dx \qquad \textit{Done}$$

$$\frac{d}{da}(fl(a)) \qquad \frac{-(a^2-a-1)}{a^2\cdot(a+1)^2}$$

$$\text{solve}\left(\frac{-(a^2-a-1)}{a^2\cdot(a+1)^2}=0,a\right)$$

$$a=\frac{-(\sqrt{5}-1)}{2} \text{ or } a=\frac{\sqrt{5}+1}{2}$$

$$\text{solve}\left(\frac{-(a^2-a-1)}{a^2\cdot(a+1)^2}=0,a\right)$$

$$a=-0.618034 \text{ or } a=1.61803$$

Aufgabe 2 (Blatt) → Aufg. 5/6

$k(t):=2000 \cdot t \cdot e^{-0.2 \cdot t}$ Done

$dk(t):=\frac{d}{dt}(k(t))$ Done

$ddk(t):=\frac{d^2}{dt^2}(k(t))$ Done

$k(3)$ 3292.87

solve$(dk(t)=0,t)$ $t=5.$

$ddk(5)$ -147.152

$\int_0^{14} k(t)\, dt$ 38446.1

$\int_0^{\infty} k(t)\, dt$ 50000.

solve$(ddk(t)=0,t)$ $t=10.$

$dddk(t):=\frac{d^3}{dt^3}(k(t))$ Done

$dddk(10)$ 10.8268

$f(t):=a \cdot t \cdot e^{-b \cdot t}$ Done

solve$\left(\left\{f(4)=5000,\frac{d}{dt}(f(t)) \cdot 4\right\},a,b\right)$

"Error: Argument must be a Boolean expressi▸

$df(t):=\frac{d}{dt}(f(t))$ Done

solve$(\{f(4)=5000,df(4)=0\},a,b)$

$a=1250 \cdot e$ and $b=\frac{1}{4}$

Aufgabe 5

$f(x) = ax^4 + bx^3 + cx^2 + dx + e$ Polynomfunktion 4-ten Grades