1. a) $f(x) = ax^{-1} + bx^{-2}$

$f'(x) = -ax^{-2} - 2bx^{-3}$

$f'(-\frac{1}{2}) = 0 = -2a + 4b$

$f''(-\frac{1}{2}) = 4 = -4a + 16b$

$a = 1 \quad b = \frac{1}{2}$

b) $f(x) = \frac{12x - 12}{x^2} = 12(x^{-1} - x^{-2})$

$f'(x) = -12(x^{-2} - 2x^{-3})$

$f''(x) = 24(x^{-3} - 3x^{-4})$

$f(x) = 0$

$x = 1$

$f'(x) = 0$

$x = 2$

$y = 3$

$f''(2) < 0$

Max (2|3)

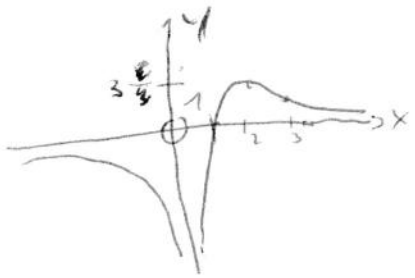
$f''(x) = 0$

$x = 3$ einfach

$y = 8/3$ Vzw

WP

WP (3|8/3)



2. $p = 3\%$

a) $P(\text{alle ehrlich}) = 0{,}97^{100} = \underline{47{,}6\%}$

b) $P(\text{mind. ein Lüg}) \geq 98\%$

$1 - P(\text{kein Lüg}) \geq 0{,}98$

$0{,}97^n \leq 0{,}02$

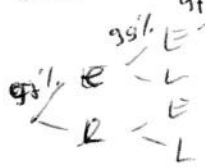
$n \geq \log_{0{,}97} 0{,}02 = 128{,}4$

~~128~~ 129 Antworten.

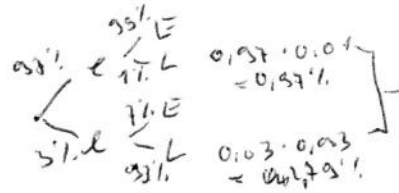
$0{,}97^2 \cdot 0{,}95^2 = \underline{92{,}2\%}$

c) L: 93%

E: 1%

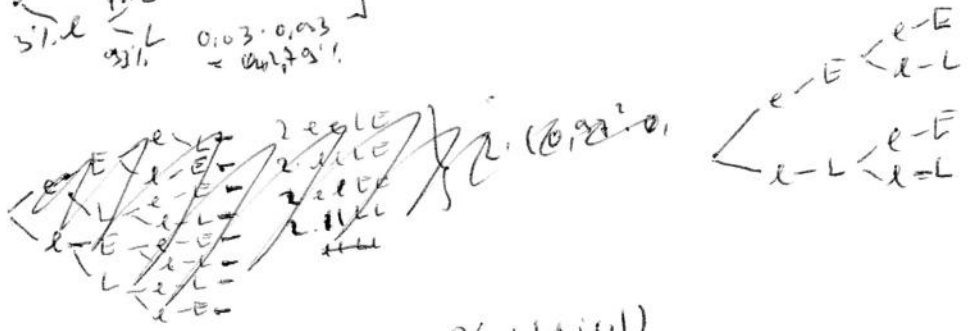


d)



$P(\ell | L) = \frac{2{,}79\%}{3{,}76\%} = \underline{74{,}2\%}$

e)



$P(\text{mind. 1 richtig}) = 1 - P(\text{nicht mind. 1})$

$= 1 - ((0{,}97 \cdot 0{,}93)^2 + 2 \cdot (0{,}97 \cdot 0{,}93 \cdot 0{,}03 \cdot 0{,}93) + (0{,}03 \cdot 0{,}93)^2)$

$= \underline{2{,}37\%}$

Mathe LK

3. $k_1: x^2+y^2=4$ P(0|7|6) $M_1(0|0)$ $R_1=2$

a) $M_2(1|1|1)$ $Q(3|1|-1)$ $R_2=2$

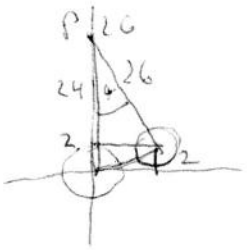
$y=-2$ $M_2(1|-1|-2)$

$k_2: (x-1)^2+(y+1)^2=4$

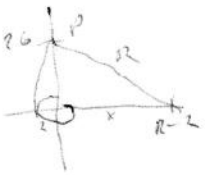
b) $y=\frac{6}{5x}$: $x^2+\left(\frac{6}{5x}\right)^2=4$ | $x^2=u$ ...

$25x^4-100x^2+36=0$

$x_{1,2}=\pm\frac{1}{5}\sqrt{20}$; $x_{3/4}=\pm\frac{3}{5}\sqrt{5}$



c) $\sin\alpha=\frac{24}{26}\Rightarrow\alpha=22{,}6°$



d) $R^2=26^2+(R-2)^2$

$R_4=170$ $M_4(168|0)$

4 a) $\overrightarrow{AC}=\begin{pmatrix}4\\4\\2\end{pmatrix}$ $AC=6$ $\overrightarrow{AP}=\begin{pmatrix}1\\2\\2\end{pmatrix}$ $AP=3$ $\overrightarrow{AB}=2\cdot\overrightarrow{AP}=\begin{pmatrix}2\\4\\4\end{pmatrix}$ $\overrightarrow{B}=\overrightarrow{A}+\overrightarrow{AB}=\begin{pmatrix}2\\5\\10\end{pmatrix}$

$B(2|5|10)$

w_a : $\overline{AM_a}$ (gleichschenklig) $\overrightarrow{M_a}=\frac{\overrightarrow{B}+\overrightarrow{C}}{2}=\begin{pmatrix}3\\5\\9\end{pmatrix}$

$\overrightarrow{AM_a}=\begin{pmatrix}3\\4\\3\end{pmatrix}$ $w_a=\sqrt{34}$

b) $\int_{-12}^{10}\sqrt{\frac{1}{3}x-5}\,dx=\left[\frac{2}{3}\cdot\frac{1}{\frac{1}{3}}\sqrt{\frac{1}{3}x-5}^3\right]_{-12}^{10}=\frac{4}{3}$

c) $f(x)=a\sin(bx)$

NST : 5π

Länge: 5π ≙ x

Abstand Ext: 13π

$10\pi\rightarrow a=6\pi$

$\sin x$: NST π $\rightarrow b=\frac{1}{5}$

$f(x)=6\pi\sin\left(\frac{1}{5}x\right)$

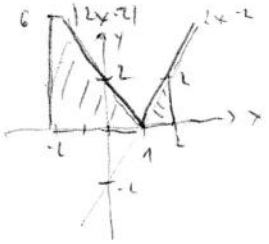
d) $A=x\cdot y\rightarrow\max$ $u=2x+2\pi y=400$

$x=200-\pi y$

$=(200-\pi y)\cdot y$

Parabel → Scheitel abs. Max | Mitte NST $y=0$ / $y=200/\pi$ $\Rightarrow$ $100/\pi=y$ $x=100$

e)



$A=\frac{1}{2}\cdot6\cdot3+\frac{1}{2}\cdot1\cdot2=10$