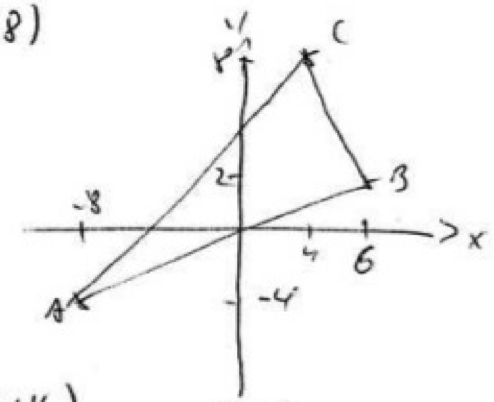
Pass H11

1. $A(-8|-4)$ $B(6|2)$ $C(4|8)$




∟ bei B ?

$\vec{AB}\cdot\vec{BC} = \begin{pmatrix}14\\6\end{pmatrix}\begin{pmatrix}-2\\6\end{pmatrix} = -28+36 \neq 0$

Nein

Schwerpunkt

$\vec{r}_s = \frac{1}{3}(\vec{r}_A + \vec{r}_B + \vec{r}_C) = \frac{1}{3}\begin{pmatrix}-8+6+4\\-4+2+8\end{pmatrix} = \frac{1}{3}\begin{pmatrix}2\\6\end{pmatrix}$ $\underline{S(\frac{2}{3}|2)}$

Umkreismittelpunkt (Mittelsenkrechte)

$m_c: \vec{X} = \begin{pmatrix}-1\\-1\end{pmatrix} + \lambda\begin{pmatrix}6\\-14\end{pmatrix}$

$m_a: \vec{X} = \begin{pmatrix}5\\5\end{pmatrix} + \mu\begin{pmatrix}6\\2\end{pmatrix}$

I $\quad -1 + 3\lambda = 5 + 3\mu$

II $\quad -1 - 7\lambda = 5 + \mu$

I − 3II: $2 + 24\lambda = -10$

$\lambda = -\frac{12}{24} = -\frac{1}{2}$

$\vec{r}_M = \begin{pmatrix}-1\\-1\end{pmatrix} - \frac{1}{2}\begin{pmatrix}3\\-7\end{pmatrix} = \begin{pmatrix}-1-\frac{3}{2}\\-1+\frac{7}{2}\end{pmatrix}$

$\underline{M(-\frac{5}{2}|\frac{5}{2})}$

Euler:

$\underline{\vec{X} = \begin{pmatrix}-5/2\\5/2\end{pmatrix} + \lambda\begin{pmatrix}19/6\\-1/2\end{pmatrix}}$

2.1. Pass 4/1

a) Primzahlen : 2, 3, 5, 7 d.h. 4 von 8

$WS(prim) = \frac{1}{2}$

$WS(2prim) = \frac{1}{4}$

b) A.S. = 11 $\quad 11 = 8+3 = 7+4 = 6+5$
$\quad = 3+8 = 4+7 = 5+6$ } 6 günstige von $8 \cdot 8 = 64$ möglichen

$WS(A.S = 11) = \frac{6}{64} = \frac{3}{32}$

c) mind. eine 7 :

$WS(\text{mind. eine } 7) = 1 - WS(\text{keine } 7) = 1 - \left(\frac{7}{8}\right)^2 = \frac{15}{64}$

d) A.S. Keine Primzahl

Primzahlen : 2, 3, 5, 7, 11, 13

$2 = 1+1$ | 1
$3 = 1+2 = 2+1$ | 2
$5 = 1+4 = 2+3 = 3+2 = 4+1$ | 4
$7 = 1+6 = 2+5 = 3+4 = 4+3 = 5+2 = 6+1$ | 6
$11 = s.o.$ | 6
$13 = 5+8 = 6+7 = 7+6 = 8+5$ | 4
| 23

$WS(\text{A.S. Keine Primzahl}) = 1 - WS(\text{A.S ist prim})$
$= 1 - \frac{23}{64} = \frac{41}{64}$

2. $P(|A_1 - A_2| \leq 1) = \frac{1}{3}$ ?

$|A_1 - A_2| \leq 1$ : $|A_1 - A_2| = 0$ $\quad (1,1);(2;2) \ldots (8,8)$ : 8
$|A_1 - A_2| = 1$ $\quad (1,2)(2,3),(3,4) \ldots (7,8)$
$(2,1)(3,2)(4,3) \ldots (8,7)$ } 14
22

$P(|A_1 - A_2| \leq 1) = \frac{22}{64} = \frac{11}{32} \approx 0{,}34375$

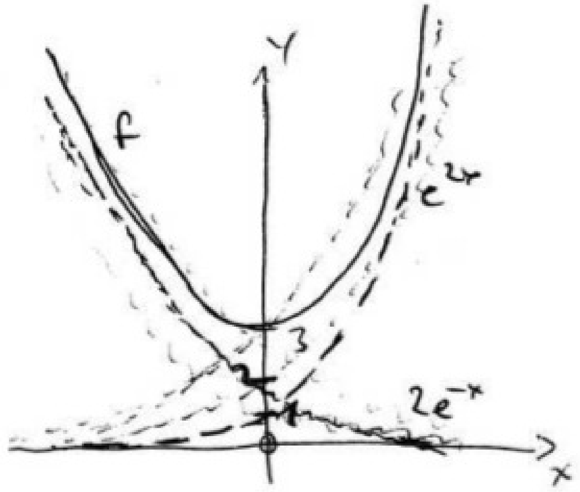
Nein, die WS, daß sich die Augenzahlen um weniger als 2 unterscheiden, beträgt nicht 1/3.

Pass HH

3 a) $f(x) = \frac{e^{3x}+2}{e^x} = e^{2x} + 2e^{-x}$

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

$f''(x) = 4e^{2x} + 2e^{-x}$




$f'(x) = 0$

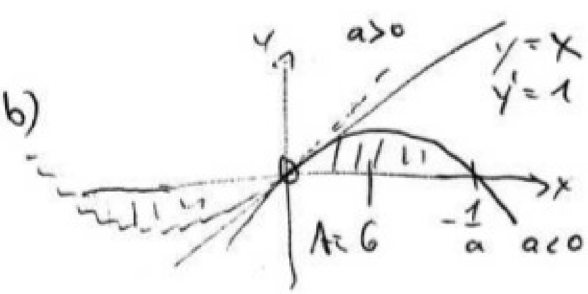
$2e^{2x} - 2e^{-x} = 0$

$e^{3x} = 1$

$\underline{x = 0} \quad \underline{y = 3}$

$f''(0) = 6 > 0 \Rightarrow \underline{\text{Min } (0|3)}$

b)




p: $y = ax^2 + bx + c \quad y' = 2ax + b$

durch (0|0): $\underline{c = 0}$

in 0 $y' = \underline{1 = b}$

p: $y = ax^2 + x$

$y = 0 = \underbrace{x}_{\underline{x=0}}\underbrace{(ax+1)}_{\underline{x=-\frac{1}{a}}}$

$A = 6 = \int_0^{-\frac{1}{a}} (ax^2 + x)\,dx$

$6 = \left[a\frac{x^3}{3} + \frac{x^2}{2}\right]_0^{-\frac{1}{a}}$

$6 = \frac{a}{3}\left(-\frac{1}{a}\right)^3 + \frac{1}{2}\left(-\frac{1}{a}\right)^2$

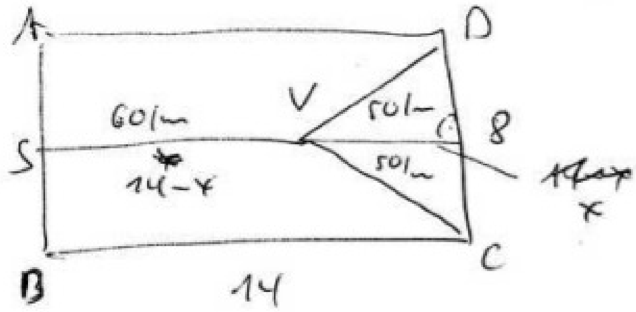
$6 = -\frac{1}{3a^2} + \frac{1}{2a^2}$

$6 = \frac{1}{6a^2}$

$a = \pm 6$

$\underline{a = -6}$ damit Fläche im I. Quadrant

4.




[Passlt…

$$\text{Kosten} = \left(60 \cdot x + \sqrt{(14-x)^2+4^2} \cdot 2 \cdot 50\right)$$

$$= 60(14-x) + \sqrt{x^2+16} \cdot 100 \rightarrow \min \qquad x \in [0;14]$$

$$K' = -60 + \frac{100x}{\sqrt{x^2+16}} = 0$$

$$-3\sqrt{x^2+16} + 5x = 0$$

$$25x^2 = 9(x^2+16)$$

$$16x^2 = 144$$

$$\underline{x = \pm 3} \qquad -3 \notin D$$

VZT

| $x$ | 2 | 3 | 4 |
|---|---|---|---|
| $K'(x)$ | − | 0 | + |

$\searrow \rightarrow \nearrow$

<u>Min</u> bei $x = 3$m $\underline{K(3) = 1160 \text{ Fr.}}$

Ränder $K(0) = 1240$ Fr. ✓
$K(14) = 1456.01$ Fr. ✓

$\underline{SV = 11\text{m}}$

$\underline{VC = VD = 5\text{m}}$

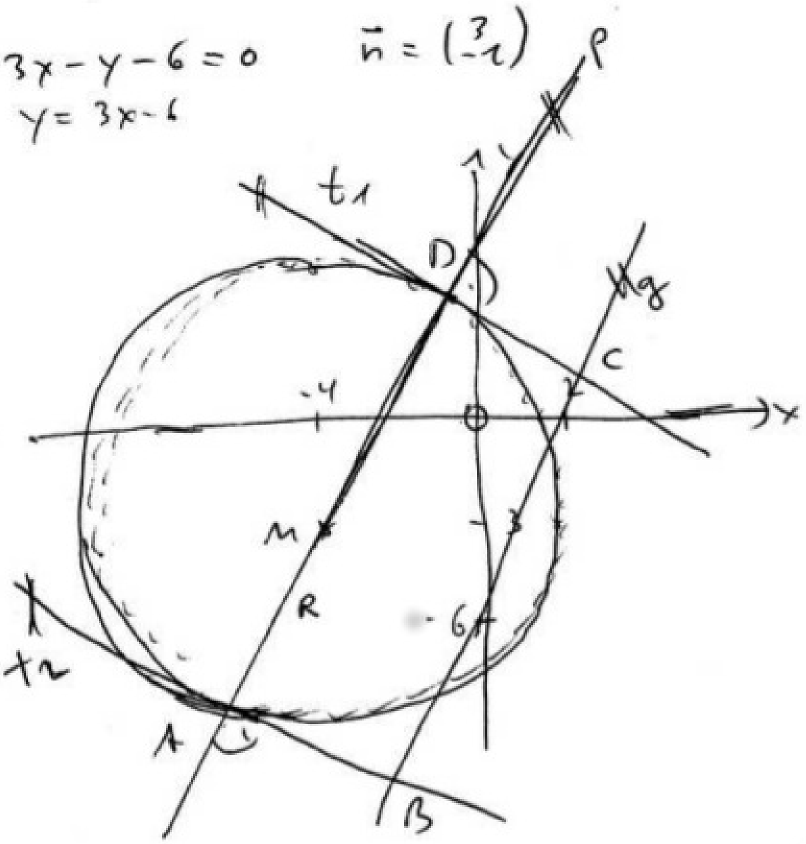
5. 

$k: x^2+y^2+8x+6y-15=0$

$(x+4)^2+(y+3)^2=40 \qquad M(-4|-3) \quad R=\sqrt{40}\approx 6{,}3$

$g: 3x-y-6=0 \qquad \vec{n}=\binom{3}{-1}$

$y=3x-6$




a) $A = AD \cdot AB \qquad AD = 2R = 2\cdot\sqrt{40} = 4\sqrt{10}$

$AB$: Abstand $M$ zu $g$: Hesse form $g$: $\dfrac{3x-y-6}{\sqrt{10}}=0$

$M(-4|-3)$: $\left|\dfrac{3\cdot(-4)-(-3)-6}{\sqrt{10}}\right|$

$=\dfrac{15}{\sqrt{10}} = \dfrac{15}{10}\sqrt{10} = \dfrac{3}{2}\sqrt{10}$

$\underline{\underline{A}} = 4\cdot\sqrt{10}\cdot\dfrac{15}{\sqrt{10}} = \underline{\underline{60}}$

b) $\vec{v}$ von $g$: $\vec{v}=\binom{1}{3}$ $\quad \vec{MD}\sim\vec{v}$ mit $|\vec{MD}|=2\sqrt{10}$ $\quad \vec{MD}=2\vec{v}=\binom{2}{6}$

$|\vec{v}|=\sqrt{10}$

$\vec{r}_D = \vec{r}_M + \vec{MD} = \binom{-4}{-3}+\binom{2}{6} = \binom{-2}{3}$ $\quad \underline{D(-2|3)}$

$\vec{r}_A = \vec{r}_M - \vec{MD} = \binom{-4}{-3}-\binom{2}{6} = \binom{-6}{-9}$ $\quad \underline{A(-6|-9)}$

$\vec{AB}\sim\vec{n} \quad |\vec{AB}|=\frac{3}{2}\sqrt{10} \Rightarrow \vec{AB}=\frac{3}{2}\cdot\vec{n}$ $\quad \vec{r}_B=\vec{r}_A+\frac{3}{2}\vec{n}=\binom{-3/2}{-21/2}$ $\quad \underline{B(-\frac{3}{2}|-\frac{21}{2})}$

$\vec{r}_C=\vec{r}_D+\frac{3}{2}\vec{n}=\binom{5/2}{3/2}$ $\quad \underline{C(\frac{5}{2}|\frac{3}{2})}$