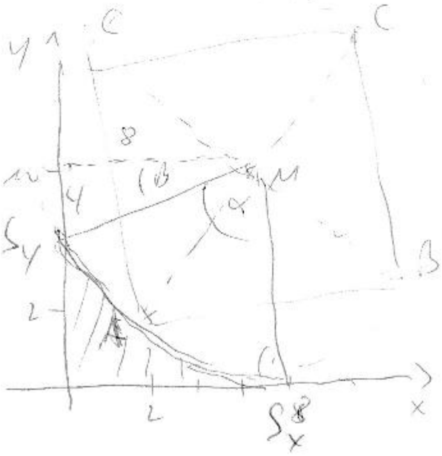
Pass MA
1A 15

1.



a) $\overrightarrow{AM} = \begin{pmatrix} 6 \\ 8 \end{pmatrix} \quad |\overrightarrow{AM}| = 10 = \frac{d}{2}$

$d = 20$

$d = a\sqrt{2}$

$a = \frac{d}{\sqrt{2}} \quad \underline{A} = a^2 = \frac{d^2}{2} = \frac{400}{2} = \underline{200}$

b) $\vec{r}_C = \vec{r}_A + 2\overrightarrow{AM} = \begin{pmatrix} 2 \\ 2 \end{pmatrix} + \begin{pmatrix} 12 \\ 16 \end{pmatrix} = \begin{pmatrix} 14 \\ 18 \end{pmatrix} \quad C(14|18)$

$\vec{r}_B = \vec{r}_M + \vec{n}_{AM} = \begin{pmatrix} 6 \\ 8 \end{pmatrix} + \begin{pmatrix} 8 \\ -6 \end{pmatrix} = \begin{pmatrix} 14 \\ 2 \end{pmatrix} \quad B(14|2)$

$\vec{r}_D = \vec{r}_M + \vec{n}^*_{AM} = \begin{pmatrix} 6 \\ 8 \end{pmatrix} + \begin{pmatrix} -8 \\ 6 \end{pmatrix} = \begin{pmatrix} -2 \\ 14 \end{pmatrix} \quad D(-2|14)$

c) $k: (x-8)^2 + (y-10)^2 = 100$

$S_x: (x-8)^2 + (0-10)^2 = 100$

$\underline{x = 8}$

$\overrightarrow{MS_x} = \begin{pmatrix} 0 \\ -10 \end{pmatrix}$

$S_y: (0-8)^2 + (y-10)^2 = 100$

$y_{1,2} = \pm 6 + 10$

$y_1 = 16$

$\underline{y_2 = 4}$

$\overrightarrow{MS_y} = \begin{pmatrix} -8 \\ -6 \end{pmatrix} \quad \tan\beta = \frac{4}{8}$

$\beta = 26{,}56°$

$\alpha = 90° - \beta = 63{,}435°$

$A = A_{Trapez} - A_{Sekt} = A_{OS_xMS_y} - A_{S_yMS_x}$

$= \frac{6+10}{2} \cdot 8 - \frac{63{,}435}{360°} \cdot 10^2 \cdot \pi$

$\underline{A = 8{,}64}$

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2. $f(x) = ax + b\sqrt{x}$ $\quad D_f = \mathbb{R}_0^+$

$f'(x) = a + \frac{b}{2\sqrt{x}}$ $\quad D_{f'} = \mathbb{R}^+ \subseteq$ senk. T.

I. $f(4) = -4$

II. $f'(4) = 0$

I $4a + 2b = -4$

II. $a + \frac{b}{4} = 0$

$\underline{b = -4}$

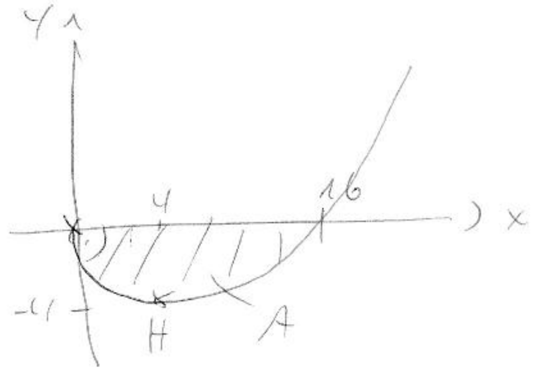
$\underline{a = 1}$ $\quad \underline{\underline{f(x) = x - 4\sqrt{x}}}$

NST. $x - 4\sqrt{x} = 0$

$x = 4\sqrt{x} \quad |:\sqrt{x} \neq 0 \rightarrow \underline{x = 0}$ Lsg.

$\sqrt{x} = 4$

$\underline{x = 16}$ Probe ✓



$$A = -\int_0^{16} f(x)\,dx = -\left[\frac{x^2}{2} - \frac{8}{3}x^{\frac{3}{2}}\right]_0^{16} = \underline{\underline{\frac{128}{3}}}$$

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3. $p = 0{,}6$

a) $P(\text{Kein Keim im Samen}) = \underline{\underline{0{,}4^n = (1-p)^n}}$

b) $P(\text{mind. 2 von 8})$

$= 1 - P(\text{weniger als 2 von 8})$

$= 1 - P(1 \text{ von } 8) - P(0 \text{ von } 8)$

$= 1 - 8 \cdot 0{,}6^1 \cdot 0{,}4^7 - 0{,}4^8 = \underline{99{,}15\,\%}$

c) $P(\text{mind. ein von } 8) > 0{,}9999$

$1 - P(\text{Kein v. } 8) > 0{,}9999$

$1 - (1-p)^8 > 0{,}9999$

$(1-p)^8 < 0{,}0001$

$1-p < \sqrt[8]{0{,}0001}$

$p > 1 - \sqrt[8]{0{,}0001}$

$\underline{p > 68{,}38\,\%}$

4. $f(x) = e^{1-x}$ $\quad P(a \mid f(a))$

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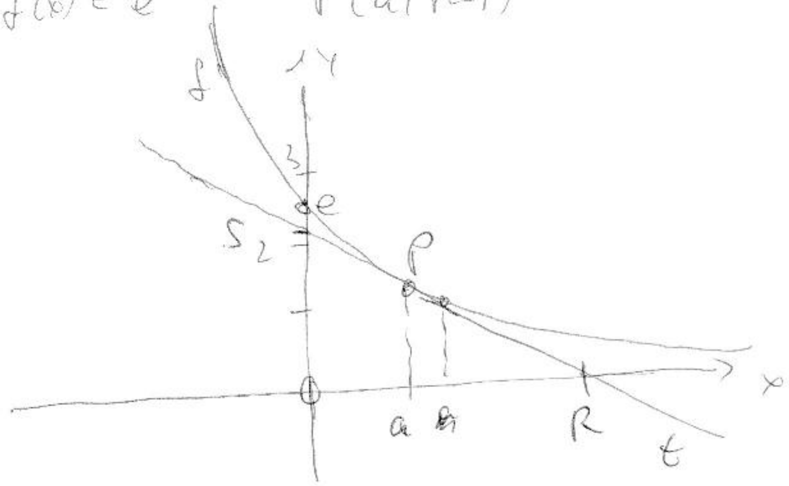
a/4)



$$f'(x) = -e^{1-x}$$

$$m = f'(a) = -e^{1-a}$$

$$t:\quad y = -e^{1-a}(x-a) + e^{1-a}$$

$$\underline{y = -e^{1-a}x + (1+a)e^{1-a}}$$

$$\underline{S(0 \mid (1+a)e^{1-a})}$$

$$R:\quad 0 = -e^{1-a}x + (1+a)e^{1-a}$$

$$\underline{x = 1+a}$$

$$\underline{R(1+a \mid 0)}$$

b) $\underline{A_{ORS}} = \frac{1}{2}(1+a)(1+a)e^{1-a} = \underline{\frac{(1+a)^2}{2} \cdot e^{1-a}}$

$a=2$: $\quad \underline{t:\ y = -\frac{1}{e}x + \frac{3}{e} \qquad S(0 \mid 3/e) \quad R(3 \mid 0)}$

c) $A \to \max$: $\quad A'_{ORS} = \frac{1}{2}\left(2(1+a)e^{1-a} + (1+a)^2 e^{1-a}(-1)\right)$

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

$$= \frac{1}{2}\underbrace{\left(-a^2 + 1\cancel{a}\right)}_{a=\pm 1}\underbrace{e^{1-a}}_{\neq 0} = 0$$

VZW	-2	-1	0	1	2
A'	-	0	+	0	-
	↘	Min	↗	Max	↘

$a = -1$: Min

$\underline{a = 1 : \text{Max}}$

$\underline{\underline{A(1) = 2}}$

Ränder $\lim_{a \to +\infty} A(a) = 0$ Exp stärker als Pot.

$\lim_{a \to -\infty} A(a) = \infty$

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H1T

5. $f(x) = \sin x$

$g(x)$: gleiche NST wie $f(x)$, gleiche Fläche

$g(x) = ax^2 + bx \; (+c)$

$c = 0$ da $g(0) = 0 = \sin(0)$

I $g(\pi) = 0$

II $\int_0^\pi g(x) = \int_0^\pi \sin x \, dx$

I. $a\pi^2 + b\pi = 0$

II. $\left[a\frac{x^3}{3} + b\frac{x^2}{2}\right]_0^\pi = \left[-\cos x\right]_0^\pi$

$a\frac{\pi^3}{3} + b\frac{\pi^2}{2} - 0 = -\cos\pi + \cos 0$

$\frac{1}{6}(2a\pi^3 + 3b\pi^2) = 2$

I $b = -a\pi$

in II: $2a\pi^3 + 3(-a\pi)\pi^2 = 12$

$-a\pi^3 = 12$

$a = -\frac{12}{\pi^3}$ $\quad$ $b = \frac{12}{\pi^2}$

$g(x) = -\frac{12}{\pi^3}x^2 + \frac{12}{\pi^2}x = -\frac{12}{\pi^3}(x^2 - \pi x)$

$g\left(\frac{\pi}{4}\right) = -\frac{12}{\pi^3}\left(\left(\frac{\pi}{4}\right)^2 - \pi\frac{\pi}{4}\right) = -\frac{12}{\pi^3}\left(\frac{\pi^2}{16} - \frac{\pi^2}{4}\right) = \frac{9}{4\pi} = 0{,}716197$

$f\left(\frac{\pi}{4}\right) = \sin\frac{\pi}{4} = \frac{1}{2}\sqrt{2} = 0{,}70711$

absolute Differenz: 0,00909

rel. Diff: 1,29 %