Pass H 19

1, a) $P(18) = (\frac{1}{6})^3 = 0{,}46\,\%$ ('666')

b) $P(\leq 5) = P(3) + P(4) + P(5) = (\frac{1}{6})^3 + 3 \cdot (\frac{1}{6})^3 + 6 \cdot (\frac{1}{6})^3 = \frac{10}{216} = 4{,}63\,\%$

111 112 113 122

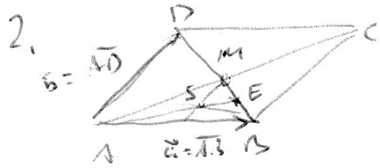
c) $P(\text{mind. eine } 6) = 1 - P(\text{keine } 6) = 1 - (\frac{5}{6})^3 = 42{,}1\,\%$

d) $P(90) = 6 \cdot (\frac{1}{6})^3 = 2{,}78\,\%$ $90 = 6 \cdot 15 = 6 \cdot 5 \cdot 3$ $6\times$

e) $P(\text{Ungerade}) = (\frac{1}{2})^3 = 12{,}5\,\%$ $u = uuu$

f) $P(6 \mid 24) = \frac{9 \cdot (\frac{1}{6})^3}{15 \cdot (\frac{1}{6})^3} = \frac{9}{15} = 60\,\%$ $24 = 2 \cdot 2 \cdot 6 = 1 \cdot 4 \cdot 6 = 2 \cdot 4 \cdot 3$ $3\times$ $6\times$ $6\times$

2,



a) $\vec{AM} = \frac{1}{2} \vec{AC} = \frac{1}{2}(\vec{a} + \vec{b})$

b)

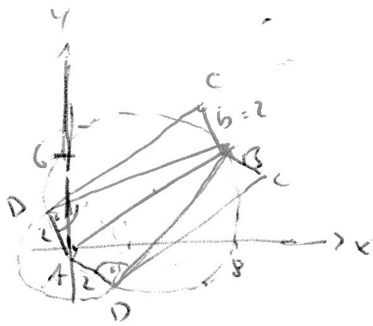
$\vec{AS} = \frac{2}{3} \vec{AE} = \frac{2}{3}(\vec{a} + \frac{1}{4} \vec{BD})$

$= \frac{2}{3}(\vec{a} + \frac{1}{4}(\vec{b} - \vec{a})) = \frac{2}{3}\vec{a} + \frac{1}{6}\vec{b} - \frac{1}{6}\vec{a}$

$\vec{AS} = \frac{1}{2}\vec{a} + \frac{1}{6}\vec{b}$

c) $\vec{a} = \begin{pmatrix} 8 \\ 6 \end{pmatrix}$ $|\vec{b}| = 2$ $\alpha = 30$

$A = a \cdot b \cdot \sin\alpha = 10 \cdot 2 \cdot \sin 30 = 10$



d) $A(0|0)$ $\vec{AD} \cdot \vec{BD} = 0$ $b = 2$

$\measuredangle ADB$

$D(x|y)$ $\vec{AD} \cdot \vec{BD} = 0$ $b = 2 = d$

$\begin{pmatrix} x-0 \\ y-0 \end{pmatrix} \begin{pmatrix} x-8 \\ y-6 \end{pmatrix} = 0$ $2 = \sqrt{x^2 + y^2}$

I $x(x-8) + y(y-6) = 0$ II $4 = x^2 + y^2$

$x^2 + y^2 - 8x - 6y = 0$

$x^2 + y^2 = 4$

$y = -\frac{4}{3}x + \frac{2}{3} \rightarrow x^2 + (-\frac{4}{3}x + \frac{2}{3})^2 = 4$

$x_1 = -0{,}856$ $y_1 = 1{,}808$

$x_2 = 1{,}496$ $y_2 = -1{,}328$

$D_1(-0{,}86 \mid 1{,}8)$ $D_2(1{,}5 \mid -1{,}3)$

3. $y = \overset{s.u.}{-}ax^2 + (2a-1)x$ $\quad a \neq 0$

a) $P(1|0) = \quad 0 = a + 2a - 1 \rightarrow a = \frac{1}{3} \quad x_s = \frac{1}{2} \quad y_s = -\frac{1}{12}$

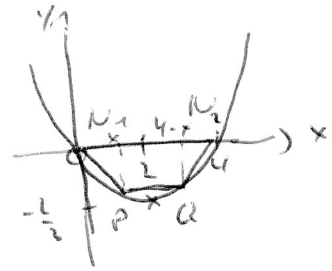
b) $x_s = "-\frac{b}{2a}" = -\frac{2a-1}{2a} = 2$

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

c) $y = \frac{1}{6}x^2 - \frac{2}{3}x$

$A = -\int_0^4 y\,dx = -\left[\frac{1}{18}x^3 - \frac{1}{3}x^2\right]_0^4$

$= \frac{16}{9}$



$N_1(x|f(x))$ $\quad PQ = 4-2x$

$Q(4-x|f(x))$

Symmetrie Parabel

d) $A = -\frac{4+4-2x}{2}\cdot f(x)$

$= (x-4)\cdot\left(\frac{1}{6}x^2 - \frac{2}{3}x\right)$

$= \frac{1}{6}(x-4)^2\cdot x \qquad D = [0;4]$

$A' = \frac{1}{6}\left(2(x-4)x + (x-4)^2\right) = \frac{1}{6}\underbrace{(x-4)}_{x=4}\underbrace{(3x-4)}_{x=\frac{4}{3}} = 0$

$A'' = x - \frac{8}{3}$

$A''(\frac{4}{3}) < 0 \Rightarrow Max$

Ränder D: $A(0) = 0$, $A(4) = 0$ } Min

} Max $\underline{x = \frac{4}{3}}$

$h = \left|f(\frac{4}{3})\right| = \frac{16}{27}$

4.1. $f(x) = \frac{5e^{-x}}{k - e^{-x}}$ $\qquad x = -2 \notin D \qquad k - e^2 = 0$

$\underline{k = e^2}$

$\lim_{x \to -\infty} \frac{5e^{-x}}{k - e^{-x}} = \lim_{x \to -\infty} \frac{5}{\underbrace{ke^x}_{0} - 1} = -5$

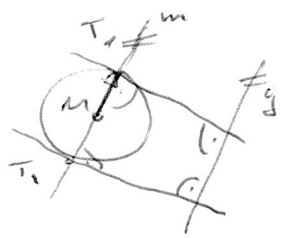
4.2. $x^2 + 8x + y^2 - 6y + 10 = 0$ $\qquad g: x + 2y + 3 = 0$

$x^2 + 8x + 16 + y^2 - 6y + 9 = 16 + 9 - 10$ $\qquad \vec{n} = \binom{1}{2}$

$(x+4)^2 + (y-3)^2 = 5$ $\qquad m = -\frac{1}{2}$

$M(-4|3) \qquad r = \sqrt{5}$ $\qquad \vec{m} = \binom{2}{-1}$

$|\vec{m}| = \sqrt{5}$



m:

$T_{1/2} = \binom{-4}{3} \pm \binom{2}{-1}$ $\qquad T_1 = \binom{-2}{2}$ $\qquad t_1: \vec{X} = \binom{-2}{2} + s\binom{1}{2}$

$T_2 = \binom{-6}{4}$ $\qquad t_2: \vec{X} = \binom{-6}{4} + s\binom{1}{2}$

3.

$y = -ax^2 + (2a-1)x \qquad a \neq 0$

a) $P(1|0)$: $\quad 0 = -a + 2a - 1$

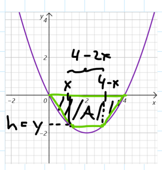
$\underline{a = 1}$

b) $S: x = 2$: $\quad x_s = "-\frac{b}{2a}" = 2 = -\frac{2a-1}{-2a} \Rightarrow \underline{a = -\frac{1}{2}}$

c) $y = \frac{1}{2}x^2 - 2x$:

$\underline{A} = -\int_0^4 y\,dx$

$= -\left[\frac{1}{6}x^3 - x^2\right]_0^4 = \underline{\frac{16}{3}}$



d) $A_T = -\frac{4 + 4 - 2x}{2}\cdot y = -(4-x)\left(\frac{1}{2}x^2 - 2x\right) = \frac{1}{2}x(x-4)^2$

$A_T' = \frac{1}{2}\left((x-4)^2 + x\,2(x-4)\right) = \frac{1}{2}\underbrace{(x-4)}_{x=4}\underbrace{(3x-4)}_{\underline{x=\frac{4}{3}}} = 0$

$\underline{h} = y(\frac{4}{3}) = \underline{\frac{16}{9}} = 1{,}78$