Mathe 6F
F17

1. a) $(x^3-x^2-3x+3):(x-1)=x^2-3$

NST: $x_1=1$ $x=\pm\sqrt{3}$

$3x^2-2x-3=0$

$x_{1,2}=\frac{1\pm\sqrt{10}}{3}$ $y_1=-0{,}42$ $y_2=4{,}3$

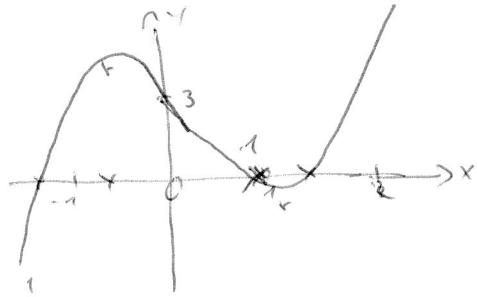
$f''(x_1)>0 \Rightarrow$ Min $\left(\frac{1+\sqrt{10}}{3}\middle|-0{,}42\right)$

$f''(x_2)<0 \Rightarrow$ Max $\left(\frac{1-\sqrt{10}}{3}\middle|4{,}3\right)$

$f''(x)=6x-2$

$f''=0$

$x=\frac{1}{3}$ $y=1{,}93$ einfache NST $\rightarrow$ VZW $\rightarrow$ WP $\left(\frac{1}{3}\middle|1{,}93\right)$



b) $A=\int_0^1 f(x)\,dx = \left[\frac{1}{4}x^4-\frac{1}{3}x^3-\frac{3}{2}x^2+3x\right]_0^1=\frac{17}{12}$

c) $g(x)=x^3-1$

$f=g$

$-x^2-3x+4=0$

$x_1=-4$

$x_2=1$

$A=\int_{-4}^{1}(f-g)\,dx=\left[-\frac{1}{3}x^3-\frac{3}{2}x^2+4x\right]_{-4}^{1}=\frac{125}{6}$

2. $p=\frac{3}{20}$

a) P(10 genießbar) $=\left(\frac{17}{20}\right)^{10}$ = 19,6%

b) P(nicht alle ung. v 8) = 1 − P(alle 8 ug.) $=1-\left(\frac{3}{20}\right)^8$ = 99,99997%

c) P(einer v. 4 ug.) $=\binom{4}{1}\cdot\left(\frac{3}{20}\right)^1\left(\frac{17}{20}\right)^3$ = 36,8%

d) P(1 v. 6 ug.) $=\binom{6}{1}\left(\frac{3}{20}\right)^1\left(\frac{17}{20}\right)^5$ = 39,93%

P(0 v. 6 ug.) $=\left(\frac{17}{20}\right)^6$ = 37,71%

höchstens 1 v. 6 u.: 77,65%

in 3 Packungen: $(77{,}65\%)^3$ = 46,8%

e) 2 · P(1 v. 6 u.) · P(0 v. 6 u.) = 2 · 39,93% · 37,71% = 30,1%

3. a) $\left.\begin{aligned}-7x-y&=25\\ x^2+y^2&=25\end{aligned}\right\}$ $T_1(-4|3)$ $T_2(-3|-4)$

$t_1: \vec{X}=\binom{-7}{-1}+s\binom{3}{4}$

$t_2: \vec{X}=\binom{-7}{-1}+s\binom{4}{-3}$

b) $\binom{3}{4}\cdot\binom{4}{-3}=0 \Rightarrow ⊾$

c) $P(-7|-1)$ $Y(0|5)$ $X(5|0)$

$\vec{S}=\frac{1}{3}\binom{-7+5}{-1+5}=\frac{1}{3}\binom{-2}{4}$ $S\left(-\frac{2}{3}\middle|\frac{4}{3}\right)$

d) $\overline{PM}=\sqrt{50}=5\sqrt{2}$ $r_1=\sqrt{50}-5$ $r_2=\sqrt{50}+5$

$k_1: (x+7)^2+(y+1)^2=(\sqrt{50}-5)^2$

$k_2: (x+7)^2+(y+1)^2=(\sqrt{50}+5)^2$

4.

Mater 6F
F07

a) $y = \ln(ax+b)$ $\qquad$ I $\;y(1) = \ln 2 = \ln(a+b) \Rightarrow a+b = 2$

$y' = \frac{a}{ax+b}$ $\qquad$ II $\;y'(1) = 2 = \frac{a}{a+b}$

$\underline{a = 4}$
$\underline{b = -2}$

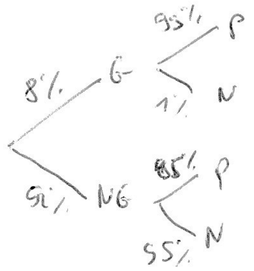
b) $A(2|3|7)$ $\quad B(\cancel{M}-2|4|5)$

i) $\vec{x} = s\begin{pmatrix}2\\3\\7\end{pmatrix} + t\begin{pmatrix}-2\\4\\5\end{pmatrix}$

ii) $\vec{x} = \begin{pmatrix}2\\3\\7\end{pmatrix} + s\begin{pmatrix}0\\1\\0\end{pmatrix} + t\begin{pmatrix}0\\4\\1\end{pmatrix}$

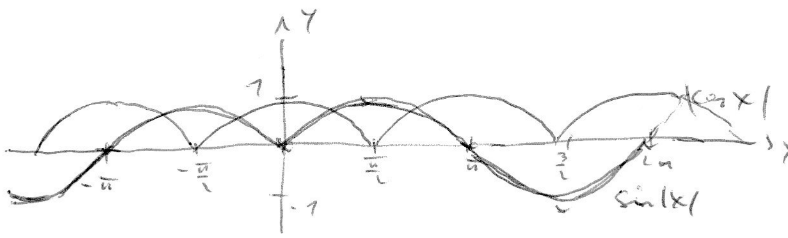
iii) $\vec{x} = s\begin{pmatrix}-4\\1\\-2\end{pmatrix}$

c)



$\underline{P(P|G)} = \frac{8\% \cdot 95\%}{8\% \cdot 95\% + 92\% \cdot 5\%} = \underline{63{,}3\%}$

d) $f = |\cos x|$ $\quad g = \sin|x|$



1. Quad.: $\cos x = \sin x$, $x = \frac{\pi}{4}$

2. Quad.: $-\cos x = \sin x$, $x = \frac{3}{4}\pi$

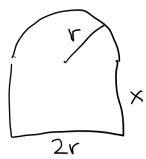
3. Quad.: "

4. Quad.: $\cos x = \sin x$, $x = \frac{\pi}{4}$

$x = \pm\left(\frac{\pi}{4} + z \cdot 2\pi\right)$

$x = \pm\left(\frac{3}{4}\pi + z \cdot 2\pi\right)$

e)



$u = 2r + 2x + \frac{1}{2}2\pi r$

$u = (2+\pi)r + 2x \rightarrow x = \frac{u-(2+\pi)r}{2} > 0$

$A = 2rx + \frac{1}{2}\pi r^2$

$= r\left(u - (2+\pi)r\right) + \frac{\pi}{2}r^2$

$A(r) = ru - (2+\frac{\pi}{2})r^2$ $\qquad \mathbb{D} =]0; \frac{u}{2+\pi}[$

$\cap$ Parabel, absolutes Maximum

Scheitel $r = -\frac{u}{-2(2+\frac{\pi}{2})} = \underline{\underline{\frac{u}{4+\pi}}} \in \mathbb{D}$

f) $y = \frac{x^4 - 13x^2 + 36}{x^2 - x - 20}$

$x^2 - x - 20 = 0$
$(x+4)(x-5) = 0$
$x_1 = -4 \quad x_2 = 5$

Asymptote (senkrecht): $\underline{x = -4}$
$\underline{x = 5}$

$x^4 - 13x^2 + 36 = 0$
$(x^2-4)(x^2-9) = 0$
$x = \pm 2 \quad x = \pm 3$

NST: $\underline{x = \pm 2}$
$\underline{x = \pm 3}$

Zählergrad = 2 + Nennergrad: Keine schräge / waag. Asymptote