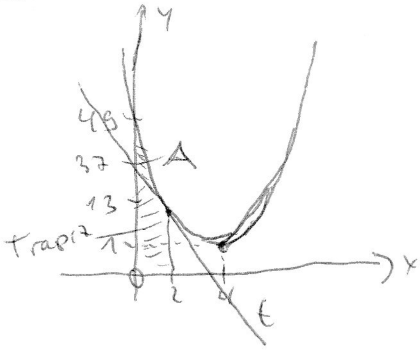
Pass #21

1. a)



b) $f'(x) = 6(x-4)$

$f'(2) = -12$

$t: \ y = -12(x-2)+13 = -12x+37$

$\underline{A} = \int_0^2 f(x)\,dx - \frac{37+13}{2}\cdot 2$

$= \left[(x-4)^3 + x\right]_0^2 - 50 = -6+64-50 = \underline{8}$

c) $\left.\begin{array}{l} F(x) = (x-4)^3 + x + c \\ F(1) = -1 \end{array}\right\} \ -27+1+c = -1$

$\underline{c = 25}$

$F''(x) = f'(x) = 6(x-4) = 0$

$\left.\begin{array}{l} \underline{x=4} \quad y = 29 \\ F'(x) = f(x): \ f(4) = 1 \end{array}\right\} \ \underline{s: y = 1\cdot(x-4)+29}$

2. a) $E_{DAB}: \ \vec{x} = \vec{r}_A + s\,\overline{AB} + t\,\overline{AD} = \begin{pmatrix}3\\5\\4\end{pmatrix} + s\begin{pmatrix}-9\\1\\-4\end{pmatrix} + t\begin{pmatrix}3\\-4\\-6\end{pmatrix} = \begin{pmatrix}-3\\2\\-6\end{pmatrix}$

$\underline{s = t = 1}, \ C \in E_{ABD}$

$\overline{AB} \times \overline{AD} = \begin{pmatrix}-22\\-66\\33\end{pmatrix} \sim \begin{pmatrix}+2\\+6\\-3\end{pmatrix} = \vec{n}_{ABD} = \vec{u}$

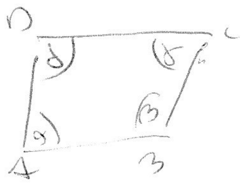
senkrecht E_{ABD}

b) $g: \ \vec{x} = \begin{pmatrix}8\\-12\\6\end{pmatrix} + m\begin{pmatrix}2\\6\\-3\end{pmatrix}$ $\qquad E_{ABD} = g$

$m = 2 \quad (s = -7/11; \ t = 12/11)$

$P(12|0|0)$

c)



$\overline{AB} = \begin{pmatrix}-9\\1\\-4\end{pmatrix}$ $\qquad \overline{DC} = \begin{pmatrix}-9\\1\\-4\end{pmatrix} = \overline{AB}$

$\overline{AD} = \begin{pmatrix}3\\-4\\-6\end{pmatrix}$ $\qquad \overline{BC} = \begin{pmatrix}3\\-4\\-6\end{pmatrix} = \overline{AD}$ $\Big\}$ Parallelogramm

$\cos\alpha = \frac{\overline{AB}\cdot\overline{AD}}{AB\ AD} = \frac{-7}{\sqrt{98}\sqrt{61}} \Rightarrow \underline{\alpha = 95{,}19° = \gamma}$

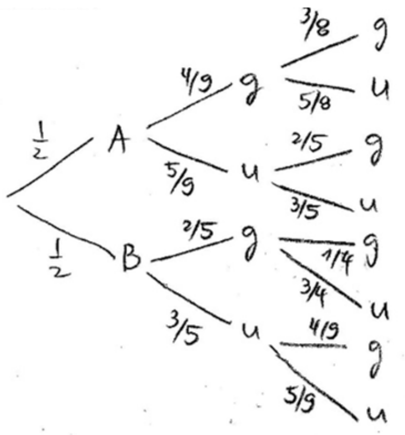
$\underline{\beta = 180 - \alpha = 84{,}8° = \delta}$

$\underline{A} = |\overline{AB} \times \overline{AD}| = \left|\begin{pmatrix}-22\\-66\\33\end{pmatrix}\right| = \underline{77}$

Pass#21

3

a)



i) $P = \frac{1}{2} \cdot \frac{4}{9} \cdot \frac{3}{8} + \frac{1}{2} \cdot \frac{2}{5} \cdot \frac{1}{4} = \frac{2}{15}$

ii) $P = \dfrac{\frac{1}{2} \cdot \frac{4}{9} \cdot \frac{3}{8}}{2/15} = \frac{5}{8}$

iii) $P = \frac{1}{2} \cdot \frac{5}{9} \cdot \frac{3}{5} + \frac{1}{2} \cdot \frac{3}{5} \cdot \frac{5}{9} = \frac{1}{3}$

b) P(genau 4 Punkte) $= P(2/2) + P(1/4) + P(2/4) + P(3/4)$
$+ P(4/3) + P(4/2) + P(4/1)$
$= \frac{1}{9} \cdot \frac{1}{5} + \frac{1}{9} \cdot \frac{1}{5} \cdot 6 = \underline{\underline{\frac{7}{45}}}$

c) P(weniger als 4 Punkte) $= P(1/1) + P(1/2) + P(2/1) + P(1/3) + P(3/1)$
$+ P(3/2) + P(2/3) = \frac{7}{45}$

P(mindestens 4 Punkte) $= \underline{\underline{\frac{38}{45}}}$

d) $P_{E_2}(E_1) = \frac{5}{6}$
(mit 3/3, 6/1, 6/2, 6/3, 6/4, 6/5)

4.1. $V = 27 = G \cdot h = \frac{s^2}{4}\sqrt{3} \cdot h$; $O = \frac{s^2}{4}\sqrt{3} + 3 \cdot s \cdot h \to \min$

$h = \frac{108}{s^2\sqrt{3}} \longrightarrow$ $= \frac{\sqrt{3}}{4}s^2 + 3s \cdot \frac{108}{\sqrt{3}s^2}$ $D = \mathbb{R}^+$

$= \frac{\sqrt{3}}{4}s^2 + \sqrt{3} \cdot 108 \frac{1}{s}$

$O' = \frac{\sqrt{3}}{2}s - \sqrt{3}\, 108 \frac{1}{s^2}$

$O'' = \frac{\sqrt{3}}{2} + \sqrt{3}\, 216 \frac{1}{s^3} > 0$ f. $s > 0$

$O' = 0$
$\underline{s} = \sqrt[3]{216} = \underline{6}$

$O'' > 0 \Rightarrow$ Min
Ränder D: $\left.\begin{array}{l} \lim_{s \to 0} O(s) = \infty \\ \lim_{s \to \infty} O(s) = \infty \end{array}\right\}$ $\underline{s = 6}$ Min
$\underline{h = \sqrt{3}}$

4.2. $f(x) = e^x\left(x^2 - \frac{7}{2}x + 2\right)$
$f'(x) = e^x\left(x^2 - \frac{3}{2}x + \cancel{4} - \frac{3}{2}\right)$
$f''(x) = \underbrace{e^x}_{\neq 0}\left(\underbrace{x^2 + \frac{1}{2}x - 3}_{=0}\right) = 0$
$x_1 = -2$ $x_2 = \frac{3}{2}$
$y_1 = 13e^{-2}$ $y_2 = -e^{-3/2}$

$d = \sqrt{\left(\frac{7}{2}\right)^2 + \left(13e^{-2} + e^{-3/2}\right)^2}$
$\underline{= 7{,}155}$