Pass F22

1 a) $\overline{AB} = \begin{pmatrix}3\\1\\1\end{pmatrix}$ $\quad \overline{BC} = \begin{pmatrix}0\\-1\\5\end{pmatrix}$ $\quad \overline{AB} \neq k\cdot\overline{BC}$

also (A, B, C) keine Gerade

E: $\vec{x} = \begin{pmatrix}-2\\1\\-2\end{pmatrix} + s\begin{pmatrix}3\\1\\1\end{pmatrix} + t\begin{pmatrix}0\\-1\\5\end{pmatrix}$

$\overline{AB} \times \overline{BC} = \begin{pmatrix}6\\-15\\-3\end{pmatrix} \sim \begin{pmatrix}-2\\5\\1\end{pmatrix}$

$-2x+5y+z+d=0$

A: $4+5-2+d=0$

E: $-2x+5y+z-7=0$

b) $\overline{BA}\cdot\overline{BD}=0$

$\begin{pmatrix}3\\1\\1\end{pmatrix}\cdot\begin{pmatrix}d-1\\-1\\5\end{pmatrix}=0$

$3d+1=0$

$\underline{d=-\frac{1}{3}}$

$\underline{A} = \frac{1}{2}\, BA\cdot BD$

$= \underline{\frac{1}{2}\sqrt{11}\sqrt{235/9}} = \underline{8{,}47}$

c) $-2\cdot 2+5k+k^2-3-7=0$

$\underline{k_1=2} \quad \underline{k_2=-7}$

$P_1(2|2|1)$

$P_2(2|-7|46)$

2. a) $f(x) = \frac{1}{3}x^3+x^2$

$f'(x) = x^2+2x$

$f''(x) = 2x+2$

$f(x)=0 \qquad \underline{x=0}$ doppelt; $\underline{x = \cancel{\pm\sqrt{9}}\,-3}$

$f'(x)=0 \qquad \underline{x=0} \quad \underline{x=-2}$

$y=0 \quad y=4/3$

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

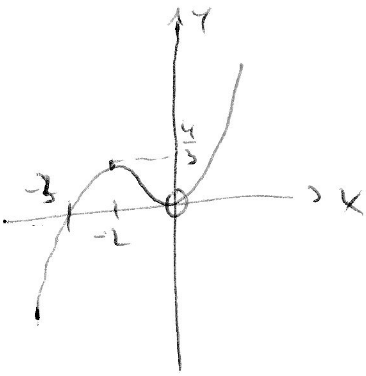
$f''(-2)<0 \Rightarrow \underline{\text{Max }(-2|4/3)}$

$f''(x)=0$

$\underline{x=-1}$ einfach

$y=2/3$ VZW

$\underline{\text{WP}(-1|2/3)}$




$\underline{A} = \int_{-3}^{0} f(x)\,dx = \left[\frac{1}{12}x^4+\frac{1}{3}x^3\right]_{-3}^{0}$

$= \underline{9/4}$

b) t: $y = f'(-1)(x+1)+\frac{2}{3}$ $\quad$ q

$y = -1(x+1)+\frac{2}{3} = -x-\frac{1}{3}$

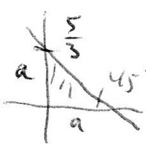
$m=-1=\tan\alpha \Rightarrow \underline{\alpha=-45°}$

c) $A = \frac{25}{18} = \frac{1}{2}a^2$

$a=\sqrt{\frac{50}{18}} = \frac{5}{3}$

$q=-\frac{1}{3}$

$\frac{6}{3}=2$




gleichschenklig

$\underline{\text{Um 2 nach oben}}$

Pass F22

3. 6r | 4g   2x z.o.t.

a) $P(A) = \frac{4\cdot 3}{10\cdot 9} = \frac{2}{15} = 13{,}3\%$

$P(B) = 1 - P(\bar{B}: 2\text{ rote}) = 1 - \frac{6\cdot 5}{10\cdot 9} = \frac{2}{3}$

$P(C) = 1 - P(\bar{C}: \underbrace{\text{kein rote}}_{2\text{ grün}}) = 1 - \frac{2}{15} = \frac{13}{15} = 86{,}7\%$

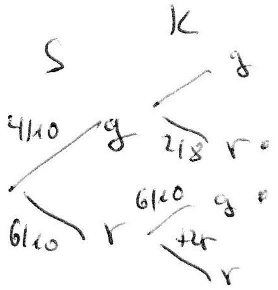
b) $\bar{D}$: eine rote und eine grüne Kugel

c) 6g | 2r:

$P(E) = \ldots \frac{2\cdot 1}{8\cdot 7}\cdot\frac{6}{10} = 2{,}14\%$

$P(F) = P(3\text{ grün}) + P(2g,1r) = \frac{6\cdot 5}{8\cdot 7}\cdot\frac{4}{10} + \frac{6\cdot 5}{8\cdot 7}\cdot\frac{6}{10} + 2\cdot\frac{6\cdot 2}{8\cdot 7}\cdot\frac{4}{10} = 70{,}7\%$

d)




$\frac{4}{10}\cdot\frac{2}{8} + \frac{6}{10}\cdot\frac{6}{10} = 46\%$

4.1. (0|0) auf Kreis: $r^2 = u^2 + v^2$   $(x-u)^2 + (y-v)^2 = u^2 + v^2$

I $x^2 - 2xu + y^2 - 2yv = 0$

$t: 21x + 20y - 145 = 0$

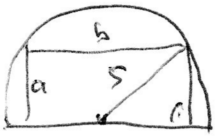
$T(x|2): x = 5$   $T(5|2) \rightarrow$   I: $-10u - 4v + 29 = 0 \quad | u = x,\ v = y$

Normale auf T: $y = \frac{20}{21}(x-5) + 2 \rightarrow$   II: $20x - 21y - 58 = 0$

$x = 2{,}9 \quad y = 0$

$M(2{,}9|0) \quad R = 2{,}9$

4.2.




$a^2 + \frac{b^2}{4} = 25$

$u = 2a + 2b \rightarrow \max$

$u = 2a + 2\sqrt{100 - 4a^2}$   $D = [0; 5]$

$u' = 2 + \frac{2}{2\sqrt{100-4a^2}}(-8a) = 0$

$\sqrt{100 - 4a^2} = 4a$

$a = \sqrt{5} \quad b = \sqrt{80}$

$u'' < 0$ für alle $a \rightarrow$ Max

Ränder D: $u(0) = 20$   $u(\sqrt{5}) = 22{,}4$

$u(5) = 10$