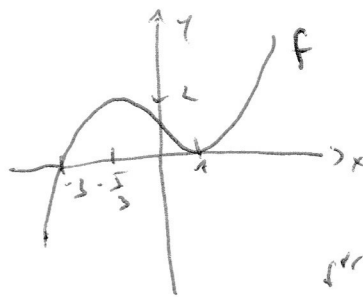


1. $f(x) = \frac{1}{5}(x-1)^2(x+3)$
 $f'(x) = \frac{1}{5}(x-1)^2 + \frac{2}{5}(x-1)(x+3)$
 $f''(x) = \frac{4}{5}(x-1) + \frac{2}{5}(x+3)$

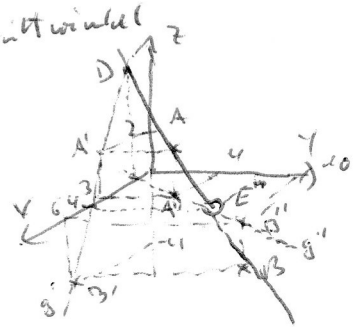


a) $f = 0$ $x = 1$ doppelt $x = -3$ einfach
 $f' = 0$ $x = 1$ $y = 0$
 $x = -\frac{1}{2}$ $y = 256/135 \approx 1.9$
 $f''(1) > 0 \Rightarrow \text{Min}(1|0)$
 $f''(-\frac{1}{2}) < 0 \Rightarrow \text{Max}(-\frac{1}{2}|1.9)$
 $f'' = 0$ $x = -\frac{1}{3}$ $y = 118/135 \approx 0.87$
 $y = 118/135 = 0.87$
 $W P(-\frac{1}{3}|0.87)$

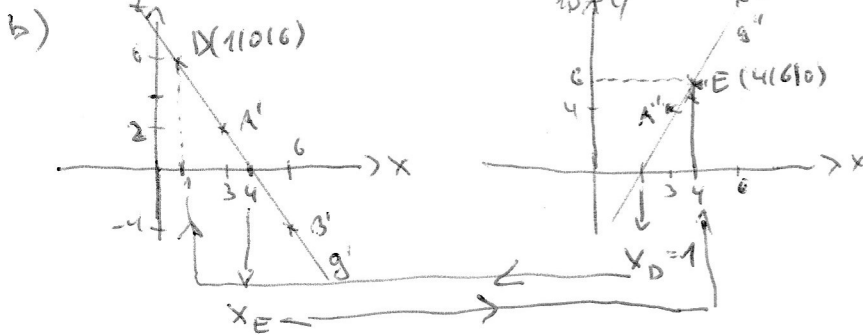
b) $A = \int_{-3}^1 f(x) dx = \left[\frac{1}{20}x^4 + \frac{1}{15}x^3 - \frac{1}{2}x^2 + \frac{3}{5}x \right]_{-3}^1 = 64/15$

c) $g(x) = -\frac{1}{2} \cos(\pi x)$
 $g'(x) = \frac{\pi}{2} \sin(\pi x)$
 $g'(1) = \frac{\pi}{2} = \tan \alpha$
 $\alpha = 57,52^\circ$

$f'(1) = 0$
 schneidwinkel



2. a) $\overline{AB} = \begin{pmatrix} 3 \\ 4 \\ -6 \end{pmatrix}$ $g: \vec{x} = \begin{pmatrix} 3 \\ 4 \\ -6 \end{pmatrix} + t \begin{pmatrix} 3 \\ 6 \\ -6 \end{pmatrix}$



c) $\begin{cases} 3 + 3t = x \rightarrow x = 1 \\ 4 + 6t = 0 \rightarrow t = -\frac{2}{3} \\ 2 - 6t = 2 \rightarrow y = 6 \end{cases} \rightarrow D(1|0|6)$

$\begin{cases} 3 + 3t = x \rightarrow x = 4 \\ 4 + 6t = y \rightarrow y = 6 \\ 2 - 6t = 0 \rightarrow t = \frac{1}{3} \end{cases} \rightarrow E(4|6|0)$

d) $\overline{AD} = \begin{pmatrix} -2 \\ -4 \\ 2 \end{pmatrix}$ $\overline{AC} = \begin{pmatrix} -4 \\ -1 \\ 5 \end{pmatrix}$ $\overline{DC} = \begin{pmatrix} -2 \\ 1 \\ 1 \end{pmatrix}$
 $AD = 6$ $AC = 45$ $DC = 3$

$DC^2 + AD^2 = AC^2 \rightarrow \square$

$A = \frac{1}{2} AD \cdot DC = \frac{1}{2} 6 \cdot 3 = 9$

$\vec{r}_F = \vec{r}_A + \overline{DC} = \begin{pmatrix} 1 \\ 0 \\ 3 \end{pmatrix}$ $F(1|0|3)$

3.1. $4x^3 + kx^2 + 9x = 0$

$x(4x^2 + kx + 9) = 0$
 $x = 0$ immer 1. Lsg.
 $D = 0 : 1 \text{ Lsg.}$
 $k^2 - 4 \cdot 4 \cdot 9 = 0$
 $k = \pm 12$

3.2. $(1-x)(x-1) = 0$
 $-(1-x) \sqrt{36} = 0$
 $1-x = \pm 6$
 $x_1 = -5$
 $x_2 = 7$

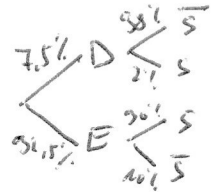
3.3.

+2	+1	0	-1	-2
673	423	162	82	16
47%	33%	25%	6%	1%

$673 + 423 + 82 + 16 = 1194 \hat{=} 87.5\%$
 $\frac{162}{1236} = 13.1\%$

Modus: +2
 Median: +1
 Mittelwert: $2 \cdot 47\% + 1 \cdot 33\% + 0 \cdot 25\% - 1 \cdot 6\% - 2 \cdot 1\% = 1,19$

4.1. PD = 7.5% E → 90% D → 98%



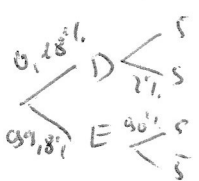
a) $P(S) = 7.5\% \cdot 2\% + 92.5\% \cdot 10\% = 8.34\%$

$10000 \cdot 8.34\% = 8340$

b) $P(S|D) = \frac{7.5\% \cdot 2\%}{8.34\%} = 0.181\%$

c) $\frac{D: 0.181\%}{E: 33.25\%} \left\{ \begin{array}{l} 0.181\% \\ 99.81\% \end{array} \right.$
 $\frac{0.181\%}{33.4\%}$

c) $P(D|S) = \frac{0.181\% \cdot 2\%}{0.181\% \cdot 2\% + 99.81\% \cdot 10\%} = 0.004\%$



d) $p \cdot 2\% + (1-p) \cdot 90\% = 87.5\% \Rightarrow p = 3\%$

4.2. $p_1 = 0.8 \quad p_2 = 0.6 \quad p_3 = 0.4 \quad p_4 = 0.2$

a) $P(\text{alle 5} = \text{Tag}) = 0.2^5 = 0.032\%$

b) A: Austersch B: Behälter i. B.
 Summe 2A: 0.2^2
 BBA: $0.8 \cdot 0.6 \cdot 0.2 = 3$
 BB₁B: $0.8 \cdot 0.6 \cdot 0.8 = 6$
 B₁B₁B: $0.8 \cdot 0.8 \cdot 0.8 = 1$
 AABBB: $0.2 \cdot 0.2 \cdot 0.8 \cdot 0.6 \cdot 0.4 = 0.2^2 \cdot 0.8 \cdot 0.6 \cdot 0.4$
 ABABBB: $0.2 \cdot 0.8 \cdot 0.2 \cdot 0.8 \cdot 0.6 = 0.2^2 \cdot 0.8 \cdot 0.6$
 ABBBAB: $0.2 \cdot 0.8 \cdot 0.6 \cdot 0.2 \cdot 0.8 = 0.2^2 \cdot 0.8 \cdot 0.6$
 ABBBA: $0.2 \cdot 0.8 \cdot 0.6 \cdot 0.4 \cdot 0.8 = 0.2^2 \cdot 0.8 \cdot 0.6 \cdot 0.4$
 B₁A₁BA: $0.8 \cdot 0.2 \cdot 0.8 \cdot 0.2 \cdot 0.6 = 0.2^2 \cdot 0.8 \cdot 0.6$

$P(\text{genau 2}) = 0.2^2 \cdot (3 \cdot 0.8 \cdot 0.6 \cdot 0.2 + 6 \cdot 0.8^2 \cdot 0.6 + 1 \cdot 0.8^3) = 12.4\%$

5. a) $M(-4|-5) \quad 0(0|0) \quad \vec{m}_0 = \begin{pmatrix} 4 \\ 3 \end{pmatrix} \xrightarrow{b} \vec{v} = \begin{pmatrix} 3 \\ -4 \end{pmatrix} \quad t: \vec{x} = t \cdot \begin{pmatrix} 3 \\ -4 \end{pmatrix}$

b) $t_2: \vec{x} = \begin{pmatrix} -8 \\ -6 \end{pmatrix} + t \begin{pmatrix} 3 \\ -4 \end{pmatrix}$