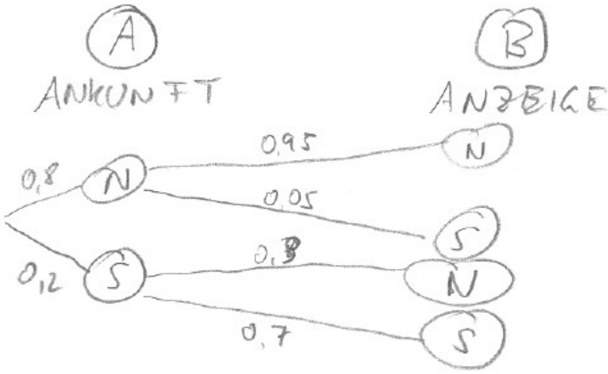
1) (a)



(b) $P(B=N) = 0{,}8 \cdot 0{,}95 + 0{,}2 \cdot 0{,}3 = 0{,}82$

(c) $P(A=S \mid B=S) = \dfrac{P(A=S \cap B=S)}{P(B=S)}$

$= \dfrac{0{,}2 \cdot 0{,}7}{1-0{,}82} = 0{,}78$

(d) $P(A=N \mid B=N) = \dfrac{P(A=N \cap B=N)}{P(B=N)} = \dfrac{0{,}8 \cdot 0{,}95}{0{,}82} = 0{,}93$

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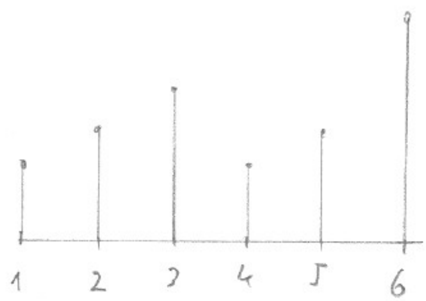
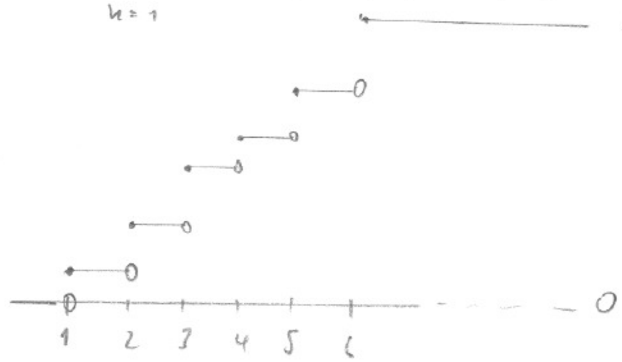
2) (a) $p = 1 - P(X<6) = \frac{3}{10}$

(c) $\mathbb{E}X = \sum_{k=1}^{6} k \cdot P(X=k) = \frac{79}{20} = 3{,}95$

$\operatorname{Var} X = \sum_{k=1}^{6} k^2 \cdot P(X=k) - (\mathbb{E}X)^2 \approx 3{,}05$

(b)





(d) $P_X(X<4) \le 1/2$ und $P_X(X>4) \le 1/2$ $\qquad x_{0,5} = 4$

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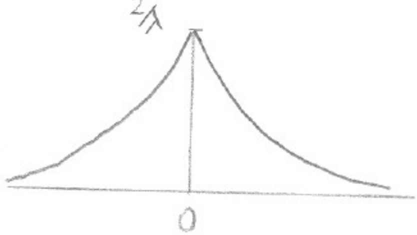
3) (a) $\int_{-\infty}^{\infty} f_X(x)\,dx = 1$ $\qquad \int_{-\infty}^{0} e^{+\lambda x}\,dx = \frac{1}{\lambda}$ und $\int_{0}^{\infty} e^{-\lambda x}\,dx = \frac{1}{\lambda}$ $\Rightarrow c = \frac{\lambda}{2}$

(b)



(c) $F_X(x) = \int_{-\infty}^{x} f_X(t)\,dt = \begin{cases} \frac{\lambda}{2}\int_{-\infty}^{x} e^{\lambda t}\,dt & x \le 0 \quad = \frac{1}{2} e^{\lambda x} \\ \frac{1}{2} + \int_{0}^{x} e^{-\lambda t}\,dt & x > 0 \quad = 1 - \frac{1}{2} e^{-\lambda x} \end{cases}$

(d) $\mathbb{E}X = 0$ (Verteilung ist symmetrisch)

4) σ sollte $0{,}4g$ sein für G = Gewicht. In Klammer die Werte für $\sigma = 4$!

(a) $P(G > 2{,}5) = P\left(N > \frac{2{,}5-2}{0{,}4}\right) = 1-\Phi(1{,}25) = 1-0{,}89 = 0{,}11$ $\quad (0{,}45)$

(b) Packung $\sim N(400, \underbrace{200 \cdot 0{,}16}_{\sigma^2} \to 36)$ $\quad (N(400, \underbrace{200 \cdot 16}_{\sigma^2}))$

(c) $P(390 \leq \text{Packungsgewicht} \leq 410) =$

$$P\left(\frac{390-400}{6} \leq N \leq \frac{410-400}{6}\right) = \phi\left(\frac{5}{3}\right) - \phi\left(-\frac{5}{3}\right) = 2\phi\left(\frac{5}{6}\right) - 1$$

$= 0{,}923$ $\quad (0{,}14)$

(d) $P(N(400, \sigma^2_{Pkg}) \leq 405) = 0{,}95$

$P(N(0,1) \leq 5/\sigma_{Pkg}) = 0{,}95 \iff \phi(5/\sigma_{Pkg}) = 0{,}95$ $\quad \underline{\underline{\sigma_{Brief} = \frac{\sigma_{Pkg}}{\sqrt{200}} = 0{,}215}}$

$\iff 5/\sigma_{Pkg} = \phi^{-1}(0{,}95)$

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5) $P(N_t = k) = \frac{(\lambda t)^k \cdot e^{-\lambda t}}{k!}$

(a) $P(N_{0,5} \geq 2) = 1 - (P(N_{0,5} = 0) + P(N_{0,5} = 1)) = 0{,}594$

(b) $P(N_{2/3} \leq 1) = P(N_{2/3} = 0) + P(N_{2/3} = 1) = 0{,}255$

(c) $P(N_{1/2} = 1 \mid N_2 = 6) = \binom{6}{1}\left(\frac{1}{4}\right)^1\left(\frac{3}{4}\right)^{6-1} = 0{,}356$

(d) $P(T_2 > 7/12) = P(N_{7/12} < 2) = 0{,}323$

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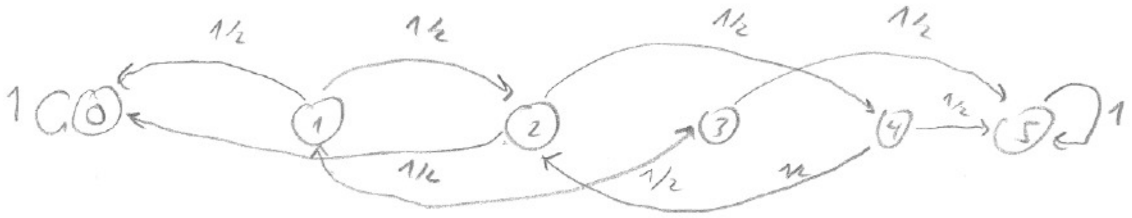
6) (a)



(b) Sei P_i die W! von Zustand i in den Zustand 5 zu gelangen.

$P_0 = 0$; $P_5 = 1$

$P_1 = \frac{1}{2}P_2$; $P_2 = \frac{1}{2}P_4$; $P_4 = \frac{1}{2} + \frac{1}{2}P_3$; $P_3 = \frac{1}{2} + \frac{1}{2}P_1$

$\Rightarrow P_1 = \frac{1}{2} \cdot \frac{1}{2}\left(\frac{1}{2} + \frac{1}{2}\left(\frac{1}{2} + \frac{1}{2}P_1\right)\right) = \frac{1}{8} + \frac{1}{16} + \frac{1}{16}P_1$

$\Rightarrow 15P_1 = 3 \Rightarrow P_1 = \frac{1}{5}$