

**Lösungen zur Klausur vom 28.08.13**

Disclaimer: Schreibfehler sind nicht auszuschließen.

**A1:** C.  $\binom{4}{2}\binom{4}{2}\binom{24}{2} = \underline{\underline{9936}}.$

**A2:** B.  $((\binom{6}{4} + \binom{6}{3}\binom{6}{1})/\binom{12}{4}) \approx \underline{\underline{0.2727}}.$

**A3:** B.

**A4:** D.  $P(B) = 2 \cdot 2 \cdot 2/16 = \underline{\underline{1/2}}.$

**A5:** B.  $P(A) = 10/16, P(B) = 1/2, P(A \cap B) = 4/16.$

**A6:** A.

**A7:** C.

**A8:** C.  $0.3 \cdot 0.6 \cdot 0.5 = \underline{\underline{0.09}}$

**A9:** A.  $(1/3) \cdot (0.4 \cdot 0.5 + 0.3 \cdot 0.5 + 0.3 \cdot 0.4) \approx \underline{\underline{0.1567}}.$

**A10:** D. 0.4.

**A11:** A.  $E(X) = \sum_j a_j p_j = \underline{\underline{1.15}}.$

**A12:** C.  $E(X^2) = 2.225, Var(X) = \underline{\underline{0.9025}}.$

**A13:** A.  $P(X = 0.25) = 0.$

**A14:** D.  $E(X) = \int_{-\infty}^{\infty} x f(x) dx = \dots = \underline{\underline{1.9369}}$

**A15:** D.  $F(x) = \int_{-\infty}^x f(t) dt = 0.28125 + 0.71875(x - 2)$  für  $x \in (2, 3) \implies q_{0.85} = \underline{\underline{2.7913}}$

**A16:** D.  $P(X \leq 6) = \int_5^6 f(t) dt \approx 0.067, P(X > 6) \approx \underline{\underline{0.933}}$

**A17:** D.  $E(X) = \int_{-\infty}^{\infty} x f(x) dx = \underline{\underline{7.6667}}.$

**A18:** A.

**A19:** D.  $X \sim B(6, 1/3), P(X = 2) + P(X = 3) = 0.5487.$

**A20:** A.  $np = 1, np(1-p) = 0.1 \implies p = 0.2, n = 5, X \sim B(5, 0.2),$  also  $P(X = 4) \approx \underline{\underline{0.0064}}$

**A21:** A.  $X \sim Po(4), P(X \leq 1) \approx \underline{\underline{0.0914}}.$

**A22:** C.  $P((X - \mu)/\sigma \leq z_\alpha) = \alpha.$

**A23:** B.  $P(X < 11.5) = \Phi((11.5 - 10)/1.5) \approx \underline{\underline{0.8413}}.$

**A24:** C.  $S \sim N(120, 12 \cdot 1.5^2), P(S > 110) \approx \underline{\underline{0.9726}}.$

**A25:** A.  $1 + 2 \cdot (1/2) + 3 \cdot (1 + 4)/2 = \underline{\underline{9.5}}.$

**A26:** D.  $P(X + Y > 1) = 1.$

- A27:** D.  $P(Y = 0.5) = \underline{\underline{0.5}}$ .
- A28:** B.  $E(XY) = \sum_i \sum_j a_i b_j p_{i,j} = \underline{\underline{0.245}}$ .
- A29:** A.  $P(X = 1) = \underline{\underline{0.7}}$ .
- A30:** B.
- A31:** C.  $X \sim B(60, 1/6)$ ,  $P(9 \leq X \leq 12) \approx \underline{\underline{0.5063}}$ .
- A32:** A.  $E(X_i) = 1/0.6 \approx \underline{\underline{1.667}}$ .
- A33:** B.  $E(X_i) = Var(X_i) + (E(X_i))^2 = 1/0.6^2 + 1/0.6^2 = \underline{\underline{5.555}}$ .
- A34:** B.  $S_1$  und  $S_2$  sind erwartungstreu für  $\mu$ .
- A35:** C.
- A36:** B.  $\mu = E(X) = (\theta + 1)/(\theta + 2) \rightsquigarrow \theta = 1/(1 - \mu) - 2$ .
- A37:** C.  $\underline{\underline{2.444}}$ .
- A38:** C.  $100 + 1.729 \cdot \sqrt{80/20} \approx \underline{\underline{103.46}}$ .
- A39:** B.  $2 \cdot 1.6 \cdot \sqrt{\hat{\pi}(1 - \hat{\pi})/400} \leq 2 \cdot 1.6 \cdot 0.5/20 = \underline{\underline{0.08}}$ .
- A40:** C.
- A41:** B.  $536/1340 = \underline{\underline{0.4}}$ .
- A42:** B.  $0.4 + 1.96 \cdot \sqrt{0.4 \cdot 0.6/1340} \approx \underline{\underline{0.4262}}$ .
- A43:** D.  $\hat{\pi} = 0.2$ ,  $0.240 - 0.160 = 0.08 = 2 \cdot \sqrt{0.2 \cdot 0.8/n} \rightsquigarrow n = \underline{\underline{400}}$ .
- A44:** A.  $\theta = 0.5$  gehört zu  $H_0$ . In 92 Fällen richtige Entscheidung.
- A45:** B.  $2(1 - \Phi(|2.07|)) \approx \underline{\underline{0.0384}}$ .
- A46:** B. Approximativer Binomialtest.  $H_0$  ablehnen, wenn  $x > 11.32$  oder  $x > 11$ .  
 $X \sim B(64, 0.15)$ ,  $P(X > 11) \approx \underline{\underline{0.2514}}$ .
- A47:** C.  $s^2 = 1.435^2 \approx \underline{\underline{2.06}}$
- A48:** B.  $t_{11,0.95} = \underline{\underline{1.795}}$ .
- A49:** A.
- A50:** C.  $t = (55 - 0.3 \cdot 140)/\sqrt{140 \cdot 0.3 \cdot 0.7} \approx \underline{\underline{2.398}}$ .
- A51:** C.  $z_{0.98} \approx \underline{\underline{2.05}}$ .
- A52:** C.  $\chi^2 = \sum_i \sum_j (n_{ij} - e_{ij})^2 / e_{ij} = \underline{\underline{6}}$
- A53:** A.  $q_{1,0.9} = \underline{\underline{2.7055}}$ .
- A54:** A.
- A55:** B.  $\rho_{XY} \cdot \sigma_X \cdot \sigma_Y = \underline{\underline{6000}}$ .

**A56:** C.  $S \sim N(4450, 36400)$ ,  $P(S > 4500) \approx \underline{\underline{0.3974}}$ .

**A57:** C. 0.034.

**A58:** D.  $0.45 + 2.1448 \cdot 0.18 = \underline{\underline{0.836}}$

**A59:** A.  $8.7 + 20 \cdot 0.45 = \underline{\underline{17.7}}$ .

**A60:** B.