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FRIEDRICH-ALEXANDER UNIVERSITÄT ERLANGEN-NÜRNBERG
FACHBEREICH WIRTSCHAFTS-WISSENSCHAFTEN

Exam Statistics (87015), summer semester 2021

Dear student,

Please mark your answers to the single-choice questions on the answer sheet on the last page in the following way: ○⊗○
If you want to correct an answer, please completely color the **wrong** answer like: ○●⊗

Please fill in your details below:

Surname : ________________________________

Name : ________________________________

Matriculation number : ________________________________

Study program : ________________________________

Room, Seat : ________________________________

Examinor : Prof. Dovern

IMPORTANT: Also mark your matriculation number on the answer sheet !

The following information may be entered by the examinor only:

Grade:

Signature examinor:

Please read these instructions carefully:

- All pages **must** remain together!
- The exam consists of 30 **single-choice questions** in total, 5 of which are related to R.
- Use the answer sheet on the last page to fill in your final answers. **Entries in the question section are not graded.**
- Write your name and matriculation number clearly on the answer sheet and additionally mark your matriculation number with crosses.
- Please use a **dark ball pen** on the answer sheet!
- The exam duration is 90 minutes.
- **Additional material allowed:**
  - Non-programmable calculator
  - A handwritten cheat sheet (two-sided) in A4 format

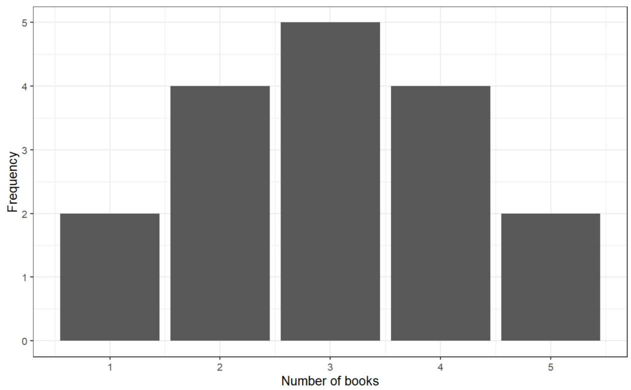
Good luck!

Exercise 1: Single-choice questions

Do not forget to mark your answers on the answer sheet and also fill in your name and matriculation number on the answer sheet.

Note: Exercise 1 consists of 25 questions. You can reach 1 point per question. Each question has **only one correct answer**. Mark the correct answer with a cross **on the answer sheet**. There is **no deduction of points for wrong answers**.

A library keeps record of how many books each customer borrows. The following graph shows the distribution of the number of books for $n = 17$ customers.



1.1 Which of the following statements about the distribution above is **not** correct?
A Arithmetic mean, median and mode are equal for the given data.
B The distribution is symmetric.
C The data seems to be uniformly distributed.
D The displayed data shows outcomes for a discrete random variable.
E The median is not influenced by outliers in the given example.

1.2 Suppose you have random sample of size $n = 100$ from a normally distributed population. The variance σ^2 is 36. The population mean μ is unkown and you use $\overline{X}$ as its estimate. Which of the following statements about the realized 95% confidence intervall (CI) for μ is correct?
A $CI = \left[\overline{x} - 1.64 \cdot \frac{36}{100}, \overline{x} + 1.64 \cdot \frac{36}{100}\right]$
B The realized confidence interval covers the true parameter μ with a probability of 95%.
C $CI = \left[\overline{x} - 1.64 \cdot \frac{6}{10}, \overline{x} + 1.64 \cdot \frac{6}{10}\right]$
D $CI = \left[\overline{x} - 1.96 \cdot \frac{6}{10}, \overline{x} + 1.96 \cdot \frac{6}{10}\right]$
E $CI = \left[\overline{x} - 1.96 \cdot \frac{36}{100}, \overline{x} + 1.96 \cdot \frac{36}{100}\right]$

1.3 Assume a very large sample ($n \rightarrow \infty$) of independently and identically distributed random variables. Which of the following statements does **not** follow from the Glivenko-Cantelli theorem?

A The empirical distribution function approaches a normal distribution.
B If the distribution of the random variables is continuous, the empirical distribution function has no "steps" that are larger than an arbitrarily small constant $\varepsilon > 0$.
C The empirical and theoretical distribution functions coincide.
D The variance of the empirical distribution function approaches the population variance.
E The mean of the empirical distribution function approaches the population mean.

A random opinion survey covers the supporters of different political parties: Conservatives (C), Social Democats (S) and Greens (G). The participants were asked to select their favorite media channel, that is newspaper (N), television (T) or online media (O). The table displays the frequencies obtained from the survey:

	Conservatives (C)	Social Democrats (S)	Greens (G)	$\sum$
newspaper (N)	59	47	62	168
television (T)	103	59	35	197
online media (O)	61	38	86	185
$\sum$	223	144	183	550

1.4 Which of the following statements is **not** correct?

A $h(N, C) = h(T, S)$
B The share of supporters for the greens is larger than the share of those that prefer online media.
C $h(S, O) = 0.0691$
D $h(T, C) = 0.1873$
E $h(O, G) = 0.1564$

1.5 Which expression describes the share of people who prefer online media among those who support the conservatives, and how large is this share?

A $h(C|O) = 0.3297$
B $h(O|C) = 0.2735$
C $h(C|O) = 0.2735$
D $h(O|C) = 0.3297$
E $h(C, O) = 0.1109$

1.6 The telephone at the customer service of a local IT service provider rings on average 5 times per hour. The employees take charge of the telephone in shifts of 3 hours.
How is the random variable E "Number of incoming calls during one shift" distributed?

A Exponential distribution: $E \sim Exp(\lambda = 0.2)$
B Normal distribution: $E \sim N(15, 0.2)$
C Poisson distribution: $E \sim P(\lambda = 15)$
D Poisson distribution: $E \sim P(\lambda = 5)$
E Binomial distribution: $E \sim B\left(n = 5, p = \frac{3}{5}\right)$

In a survey, 16 bachelor graduates, $i = 1, \ldots, 16$ stated how many semesters they studied in the bachelor program (feature B). The following table displays the results:

i:	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
b_i:	6	6	6	6	7	7	7	7	7	7	8	8	8	9	9	10

1.7 What is the span s and the upper quartile $x_{0.75}$ of the observed data?

A $s = 4$, $x_{0.75} = 8$
B $s = 5$, $x_{0.75} = 8$
C $s = 5$, $x_{0.75} = 7$
D $s = 10$, $x_{0.75} = 8$
E $s = 4$, $x_{0.75} = 7$

1.8 What is the mode of the observed data?

A 16
B 6
C 8
D 7.375
E 7

A friend of yours runs in a marathon team. The normally distributed random variable X with unknown expected value μ and variance $\sigma^2 = 0.16$ describes the marathon finishing time in hours of a runner in the team. Your friend claims that the average finishing time of her team is 4 hours or less.

You doubt your friend's claim and test it with a hypothesis test. An *i.i.d.* sample of 15 finishing times of members of the team is available.

1.9 What is the correct definition of the null hypothesis and the alternative hypothesis in this situation?

A $H_0: \mu \leq 4, H_1: \mu > 4$
B $H_0: \mu \geq 4, H_1: \mu < 4$
C $H_0: \mu \neq 4, H_1: \mu = 4$
D $H_0: \mu \geq 4, H_1: \mu \neq 4$
E $H_0: \mu = 4, H_1: \mu \neq 4$

1.10 You analyze the finishing times of the team's latest marathon and find that the average finishing time was 4.08 hours. What is the realized test statistic T of the above test?

A $T = 0.7746$
B $T = 0.2000$
C $T = 3.1250$
D $T = 0.0775$
E $T = 1.9365$

Antibody tests are used to detect if a patient developed antibodies against a virus. Consider the following events:

T: "The test returns a positive indication for antibodies"
A: "The patient developed antibodies"

The following probabilites are known:

$P(A) = 0.16, P(T) = 0.21, P(T \cap A) = 0.15$

1.11 Complete the following sentence:

$P(T|\overline{A})$ and $P(\overline{T}|A)$ describe the probability of...

A ... a true negative and false negative test result.
B ... a positive and negative test result.
C ... a false positive and false negative test result.
D ... a false negative and true positive test result.
E ... a false positive and true negative test result.

1.12 Which expression describes the probability that a patient who receives a positive test result has antibodies in their blood?

A $P(T|A) = 0.9375$

B $P(A|T) = 0.9375$

C $P(A|T) = 0.7143$

D $P(T|A) = 0.7143$

E $P(A, T) = 0.7619$

1.13 You have data with observations x_i for $i = 1,...,n$ and also $y_i = a + bx_i$, where a and b are real numbers. Which of the following statements is generally correct?

A $\overline{y} = \frac{1}{2}a + \frac{1}{2}b\overline{x}$

B $\overline{y} = b^2\overline{x}$

C $\overline{y} = a + b\overline{x}$

D $\overline{x} = \frac{a}{n} + \frac{b}{n}\overline{y}$

E $\overline{y} = \frac{a}{n} + \frac{b}{n}\overline{x}$

1.14 The following information is saved for all visitors of a particular website. Select the variable that is ratio scaled.

A Number of clicks

B IP adress

C Date of visit

D Duration of stay on the website

E Download speed (fast, average, slow)

1.15 In a lottery 4 out of 35 different numbers are drawn. How many possibilities exist to have 2 correct numbers ("2 out of 4")?

A 595

B 148

C 52360

D 3570

E 2790

1.16 How do empirical studies often establish true causal effects of a certain treatment?

A By using only information on observational units that volunteered for the study.

B By assigning observational units randomly to a treatment and a control group.

C By using a stratified sample.

D By splitting the sample into a treatment and a control group based on an arbitrary binary feature.

E Through a very large sample.

The random variable L: "Daily water use in liters (l) per household in Germany" is normally distributed with a mean of 125 l and a variance of 169 l^2, i.e. $L \sim N(125, 169)$.

1.17 What is the probability that the daily water use of a randomly selected household is above 150 liters?

A 2.74%
B 97.26%
C 55.96%
D 44.04%
E 25.00%

1.18 What is the maximum amount of water consumption of a randomly selected houshold that the local utility service can expect with a probability of 70%, $P(L < l^*)$?

A 262.52 liters
B 131.82 liters
C 0.52 liters
D 132.19 liters
E 213.62 liters

1.19 The random variable X follows a Bernoulli distribution with unknown parameter p. Consider the corresponding loglikelihood function:

$$ln(L(p)) = ln(p) \cdot \sum_{i=1}^{n} X_i + ln(1-p)\left(n - \sum_{i=1}^{n} X_i\right)$$

What is the correct maximum likelihood estimator for p?

A $\sum_{i=1}^{n} X_i - \left(n - \sum_{i=1}^{n} X_i\right)$

B $\frac{n}{\sum_{i=1}^{n} X_i}$

C $\frac{\sum_{i=1}^{n} X_i}{n}$

D $\sum_{i=1}^{n} X_i$

E $\frac{\overline{X}}{n}$

1.20 Which of the following machine learning methods is **not** based on supervised learning?

A Decision tree
B Random forest
C k-means-clustering
D None of the other answers is correct.
E Regression

The random variable X: "Number of customers that come to a hairdresser in an hour" is Poisson distributed with the parameter $\lambda = 5$.

The associated probability mass function is:

$$f(x) = \begin{cases} e^{-\lambda}\dfrac{\lambda^x}{x!} & \text{for} \quad x = 0, 1, 2, 3, 4, ... \\ 0 & \text{otherwise} \end{cases}$$

1.21 What is the probability that more than two but less than five customers come to the hairdresser in an hour?
A 57.6%
B 39.1%
C 31.6%
D 17.6%
E 1.4%

1.22 The amount of oat needed to produce one batch (1000 liters) of oat milk is normally distributed with a mean of 150kg and a standard deviation of 20kg. An oat milk producer randomly selects 49 batches of oat milk to monitor the amount of inputs used in production. What is the standard deviation of the sample mean?
A 21.43 kg
B 0.41 kg
C 2.86 kg
D 3.06 kg
E 20.0 kg

1.23 Consider two variables X and Y. The covariance of the ranks of X and Y equals 3.26. The standard deviation of the ranks of X equals 1.65 and the standard deviation of the ranks of Y equals 2.87. What is Spearman's rank correlation coefficient?
A $r_s = 1.49$
B $r_s = 0.72$
C $r_s = 0.83$
D $r_s = 0.69$
E $r_s = -0.72$

1.24 Which of the following does, ceteris paribus, clearly do **not** lead to a high power of a statistical hypothesis test?
A A small sample variance
B A low significance level
C A large significance level
D A large sample size
E A null hypothesis that is clearly at odds with the data/truth

1.25 On the basis of which criterion are features selected to construct nodes in a simple classification tree?

A Feature with largest variance that has not yet been used to construct the previous node.
B Feature is selected randomly.
C Feature with smallest variance.
D Feature that yields the largest entropy gain.
E Feature is selected such that the weighted average of the variances of the resulting sub-samples in terms of the outcome variable is maximized.

Do not forget to mark your answers on the answer sheet and also fill in your name and matriculation number on the answer sheet.

Exercise 2: Single-choice questions about R

Do not forget to mark your answers on the answer sheet and also fill in your name and matriculation number on the answer sheet.

Note: Exercise 2 consists of 5 questions. You can reach 1 point per question. Each question has **only one correct answer**. Mark the correct answer with a cross **on the answer sheet**. There is **no deduction of points for wrong answers**.

Assume a work space in R Studio for the following questions. You have one dataframe called df in your environment. The dataframe df contains information about $n = 191$ countries for the year 2015 and consists of the following variables:

Row 1: Name of the country (country)

Row 2: Per capita CO_2 emissions per capita in tons per year (pcco2)

Row 3: An indicator variable that takes the value 1 for countries with above average CO_2 emissions per capita (pcco2_high)

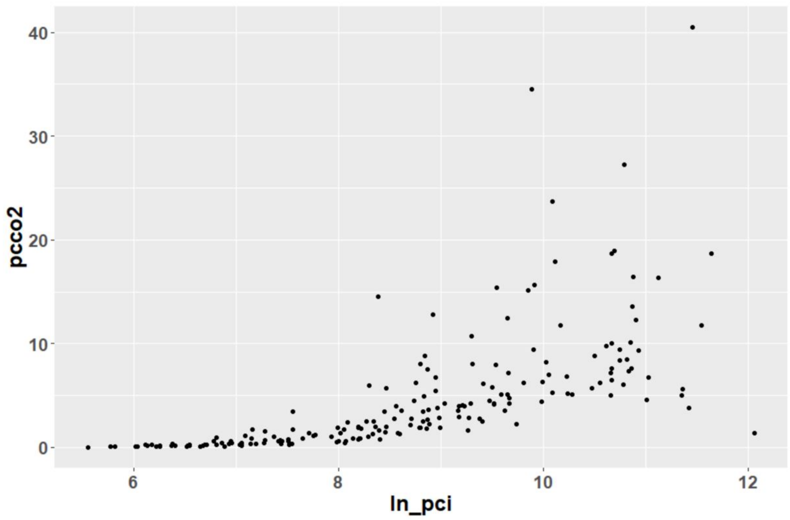
Row 4: The per capita income in US dollars (pci)

Row 5: An indicator variable that takes the value 1 for countries with above average income per capita (pci_high)

Row 6: The natural logarithm of per capita income (ln_pci)

Apart from the dataframe df, the environment contains no other objects. The dataframe contains no missing values (NAs). The *tidyverse* package is activated. Your analyses resulted in the following outputs:

```
          df$pcco2_high
df$pci_high   0   1 Sum
        0   119  22 141
        1     5  45  50
        Sum 124  67 191
```



2.1 Look at the contigency table above. Which of the following statements is **not** true?

A The share of countries with high per capita income among those with low CO_2 emissions is 4.03%.

B 23.56% of all countries have above average per capita income and above average CO_2 emissions.

C 141 countries have below average per capita income and 50 countries have above average per capita income.

D In 10% of the countries with above average per capita income, the per capita CO_2 emissions are above average.

E The individual contributions to the covariance between the variables pcco2 and ln_pci are mainly positive.

2.2 Consider the following sequence of commands:

```
df %>%
  filter(pci > mean(pci), pcco2 < mean(pcco2)) %>%
  select(country)
```

What is the ouput of this command?

A The mean per capita income and the mean per capita emissions by country.
B The countries with above average per capita income and below average CO_2 emissions.
C The per capita income and per capita emissions for countries with low CO_2 emissions.
D The per capita income and per capita emissions for countries with high CO_2 emissions.
E The countries with above average per capita income and above average CO_2 emissions.

2.3 Look at the scatter plot of the logarithm of the per capita income and the per capita CO_2 emissions. Complete the command to create this plot.

```
ggplot(data = T, aes(x = U, y = V)) + geom_W()
```

A	**T**: df,	**U**: ln_pci,	**V**: pci,	**W**: scatter
B	**T**: df,	**U**: pcco2,	**V**: ln_pci,	**W**: point
C	**T**: df,	**U**: pci,	**V**: pcco2,	**W**: point
D	**T**: df,	**U**: ln_pci,	**V**: pcco2,	**W**: point
E	**T**: dataframe,	**U**: ln_pci,	**V**: pcco2,	**W**: scatter

2.4 A friend of yours claims that the average worldwide per capita CO_2 emissions per year are above 5 tons. You doubt this claim and want to test this with a hypothesis test. The population variance is unknown. Complete the code to calculate the appropriate test statistic.

```
test_statistic  <- ( X - 5) / (Y / sqrt(Z) )
```

A	**X**: `sd(df$pcco2)`	**Y**: `mean(df$pcco2)`	**Z**: `NROW(df$pcco2)`
B	**X**: `mean(df$pcco2)`	**Y**: `length(df$pcco2)`	**Z**: `sd(df$pcco2)`
C	**X**: `sd(df$pcco2)`	**Y**: `sd(df$pcco2)`	**Z**: `count(df$pcco2)`
D	**X**: `mean(df$pcco2)`	**Y**: `sd(df$pcco2)`	**Z**: `length(df$pcco2)`
E	**X**: `mean(df$pcco2)`	**Y**: `var(df$pcco2)`	**Z**: `NROW(df$pcco2)`

2.5 What is the output in the console of the follwing for-loop?

```
for(i in 1:4){
   j <- i+2
   k <- j^3
   print(k)
}
```

A 16   25   36   49
B 1   8   27   64
C 27   64   125   216
D 8   64   216   512
E 27   42   91   166

Do not forget to mark your answers on the answer sheet and also fill in your name and matriculation number on the answer sheet.

Distribution Tables

Standard Normal Distribution - Cumulative Distribution Function

z	0	1	2	3	4	5	6	7	8	9
0.0	.5000	.5040	.5080	.5120	.5160	.5199	.5239	.5279	.5319	.5359
0.1	.5398	.5438	.5478	.5517	.5557	.5596	.5636	.5675	.5714	.5753
0.2	.5793	.5832	.5871	.5910	.5948	.5987	.6026	.6064	.6103	.6141
0.3	.6179	.6217	.6255	.6293	.6331	.6368	.6406	.6443	.6480	.6517
0.4	.6554	.6591	.6628	.6664	.6700	.6736	.6772	.6808	.6844	.6879
0.5	.6915	.6950	.6985	.7019	.7054	.7088	.7123	.7157	.7190	.7224
0.6	.7257	.7291	.7324	.7357	.7389	.7422	.7454	.7486	.7517	.7549
0.7	.7580	.7611	.7642	.7673	.7704	.7734	.7764	.7794	.7823	.7852
0.8	.7881	.7910	.7939	.7967	.7995	.8023	.8051	.8078	.8106	.8133
0.9	.8159	.8186	.8212	.8238	.8264	.8289	.8315	.8340	.8365	.8389
1.0	.8413	.8438	.8461	.8485	.8508	.8531	.8554	.8577	.8599	.8621
1.1	.8643	.8665	.8686	.8708	.8729	.8749	.8770	.8790	.8810	.8830
1.2	.8849	.8869	.8888	.8907	.8925	.8944	.8962	.8980	.8997	.9015
1.3	.9032	.9049	.9066	.9082	.9099	.9115	.9131	.9147	.9162	.9177
1.4	.9192	.9207	.9222	.9236	.9251	.9265	.9279	.9292	.9306	.9319
1.5	.9332	.9345	.9357	.9370	.9382	.9394	.9406	.9418	.9429	.9441
1.6	.9452	.9463	.9474	.9484	.9495	.9505	.9515	.9525	.9535	.9545
1.7	.9554	.9564	.9573	.9582	.9591	.9599	.9608	.9616	.9625	.9633
1.8	.9641	.9649	.9656	.9664	.9671	.9678	.9686	.9693	.9699	.9706
1.9	.9713	.9719	.9726	.9732	.9738	.9744	.9750	.9756	.9761	.9767
2.0	.9772	.9778	.9783	.9788	.9793	.9798	.9803	.9808	.9812	.9817
2.1	.9821	.9826	.9830	.9834	.9838	.9842	.9846	.9850	.9854	.9857
2.2	.9861	.9864	.9868	.9871	.9875	.9878	.9881	.9884	.9887	.9890
2.3	.9893	.9896	.9898	.9901	.9904	.9906	.9909	.9911	.9913	.9916
2.4	.9918	.9920	.9922	.9925	.9927	.9929	.9931	.9932	.9934	.9936
2.5	.9938	.9940	.9941	.9943	.9945	.9946	.9948	.9949	.9951	.9952
2.6	.9953	.9955	.9956	.9957	.9959	.9960	.9961	.9962	.9963	.9964
2.7	.9965	.9966	.9967	.9968	.9969	.9970	.9971	.9972	.9973	.9974
2.8	.9974	.9975	.9976	.9977	.9977	.9978	.9979	.9979	.9980	.9981
2.9	.9981	.9982	.9982	.9983	.9984	.9984	.9985	.9985	.9986	.9986
3.0	.9987	.9987	.9987	.9988	.9988	.9989	.9989	.9989	.9990	.9990
3.1	.9990	.9991	.9991	.9991	.9992	.9992	.9992	.9992	.9993	.9993
3.2	.9993	.9993	.9994	.9994	.9994	.9994	.9994	.9995	.9995	.9995
3.3	.9995	.9995	.9995	.9996	.9996	.9996	.9996	.9996	.9996	.9997
3.4	.9997	.9997	.9997	.9997	.9997	.9997	.9997	.9997	.9997	.9998
3.5	.9998	.9998	.9998	.9998	.9998	.9998	.9998	.9998	.9998	.9998
3.6	.9998	.9998	.9999	.9999	.9999	.9999	.9999	.9999	.9999	.9999
3.7	.9999	.9999	.9999	.9999	.9999	.9999	.9999	.9999	.9999	.9999
3.8	.9999	.9999	.9999	.9999	.9999	.9999	.9999	.9999	.9999	.9999
3.9	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.

Standard Normal Distribution - p-Quantiles

p	.0	.1	.2	.3	.4	.5	.6	.7	.8	.9
50	0.0000	.0025	.0050	.0075	.0100	.0125	.0150	.0175	.0201	.0226
51	.0251	.0276	.0301	.0326	.0351	.0376	.0401	.0426	.0451	.0476
52	.0502	.0527	.0552	.0577	.0602	.0627	.0652	.0677	.0702	.0728
53	.0753	.0778	.0803	.0828	.0853	.0878	.0904	.0929	.0954	.0979
54	.1004	.1030	.1055	.1080	.1105	.1130	.1156	.1181	.1206	.1231
55	.1257	.1282	.1307	.1332	.1358	.1383	.1408	.1434	.1459	.1484
56	.1510	.1535	.1560	.1586	.1611	.1637	.1662	.1687	.1713	.1738
57	.1764	.1789	.1815	.1840	.1866	.1891	.1917	.1942	.1968	.1993
58	.2019	.2045	.2070	.2096	.2121	.2147	.2173	.2198	.2224	.2250
59	.2275	.2301	.2327	.2353	.2378	.2404	.2430	.2456	.2482	.2508
60	.2533	.2559	.2585	.2611	.2637	.2663	.2689	.2715	.2741	.2767
61	.2793	.2819	.2845	.2871	.2898	.2924	.2950	.2976	.3002	.3029
62	.3055	.3081	.3107	.3134	.3160	.3186	.3213	.3239	.3266	.3292
63	.3319	.3345	.3372	.3398	.3425	.3451	.3478	.3505	.3531	.3558
64	.3585	.3611	.3638	.3665	.3692	.3719	.3745	.3772	.3799	.3826
65	.3853	.3880	.3907	.3934	.3961	.3989	.4016	.4043	.4070	.4097
66	.4125	.4152	.4179	.4207	.4234	.4261	.4289	.4316	.4344	.4372
67	.4399	.4427	.4454	.4482	.4510	.4538	.4565	.4593	.4621	.4649
68	.4677	.4705	.4733	.4761	.4789	.4817	.4845	.4874	.4902	.4930
69	.4958	.4987	.5015	.5044	.5072	.5101	.5129	.5158	.5187	.5215
70	.5244	.5273	.5302	.5330	.5359	.5388	.5417	.5446	.5476	.5505
71	.5534	.5563	.5592	.5622	.5651	.5681	.5710	.5740	.5769	.5799
72	.5828	.5858	.5888	.5918	.5948	.5978	.6008	.6038	.6068	.6098
73	.6128	.6158	.6189	.6219	.6250	.6280	.6311	.6341	.6372	.6403
74	.6433	.6464	.6495	.6526	.6557	.6588	.6620	.6651	.6682	.6713
75	.6745	.6776	.6808	.6840	.6871	.6903	.6935	.6967	.6999	.7031
76	.7063	.7095	.7127	.7160	.7192	.7225	.7257	.7290	.7323	.7356
77	.7388	.7421	.7454	.7488	.7521	.7554	.7588	.7621	.7655	.7688
78	.7722	.7756	.7790	.7824	.7858	.7892	.7926	.7961	.7995	.8030
79	.8064	.8099	.8134	.8169	.8204	.8239	.8274	.8310	.8345	.8381
80	.8416	.8452	.8488	.8524	.8560	.8596	.8632	.8669	.8705	.8742
81	.8779	.8816	.8853	.8890	.8927	.8965	.9002	.9040	.9078	.9116
82	.9154	.9192	.9230	.9269	.9307	.9346	.9385	.9424	.9463	.9502
83	.9542	.9581	.9621	.9661	.9701	.9741	.9781	.9822	.9863	.9904
84	.9945	.9986	1.0027	1.0069	1.0110	1.0152	1.0194	1.0237	1.0279	1.0322
85	1.0364	1.0407	1.0450	1.0494	1.0537	1.0581	1.0625	1.0669	1.0714	1.0758
86	1.0803	1.0848	1.0893	1.0939	1.0985	1.1031	1.1077	1.1123	1.1170	1.1217
87	1.1264	1.1311	1.1359	1.1407	1.1455	1.1503	1.1552	1.1601	1.1650	1.1700
88	1.1750	1.1800	1.1850	1.1901	1.1952	1.2004	1.2055	1.2107	1.2160	1.2212
89	1.2265	1.2319	1.2372	1.2426	1.2481	1.2536	1.2591	1.2646	1.2702	1.2759
90	1.2815	1.2873	1.2930	1.2988	1.3047	1.3106	1.3165	1.3225	1.3285	1.3346
91	1.3408	1.3469	1.3532	1.3595	1.3658	1.3722	1.3787	1.3852	1.3917	1.3984
92	1.4051	1.4118	1.4187	1.4255	1.4325	1.4395	1.4466	1.4538	1.4611	1.4684
93	1.4758	1.4833	1.4908	1.4985	1.5063	1.5141	1.5220	1.5301	1.5382	1.5464
94	1.5548	1.5632	1.5718	1.5805	1.5893	1.5982	1.6072	1.6164	1.6258	1.6352
95	1.6448	1.6546	1.6646	1.6747	1.6849	1.6954	1.7060	1.7169	1.7279	1.7392
96	1.7507	1.7624	1.7744	1.7866	1.7991	1.8119	1.8250	1.8384	1.8522	1.8663
97	1.8808	1.8957	1.9110	1.9268	1.9431	1.9600	1.9774	1.9954	2.0141	2.0335
98	2.0537	2.0748	2.0969	2.1201	2.1444	2.1701	2.1973	2.2262	2.2571	2.2904
99	2.3263	2.3656	2.4089	2.4572	2.5121	2.5758	2.6520	2.7477	2.8781	3.0901

Poisson Distribution - Probability Mass Function

x	λ = .005	.010	.020	.030	.040	.050	.060	.070	.080	.090
0	.9950	.9900	.9802	.9704	.9608	.9512	.9418	.9324	.9231	.9139
1	.0050	.0099	.0196	.0291	.0384	.0476	.0565	.0653	.0738	.0823
2	0.	0.	.0002	.0004	.0008	.0012	.0017	.0023	.0030	.0037
3	0.	0.	0.	0.	0.	0.	0.	.0001	.0001	.0001

x	λ = .100	.200	.300	.400	.500	.600	.700	.800	.900	1.00
0	.9048	.8187	.7408	.6703	.6065	.5488	.4966	.4493	.4066	.3679
1	.0905	.1637	.2222	.2681	.3033	.3293	.3476	.3595	.3659	.3679
2	.0045	.0164	.0333	.0536	.0758	.0988	.1217	.1438	.1647	.1839
3	.0002	.0011	.0033	.0072	.0126	.0198	.0284	.0383	.0494	.0613
4	0.	.0001	.0003	.0007	.0016	.0030	.0050	.0077	.0111	.0153
5	0.	0.	0.	.0001	.0002	.0004	.0007	.0012	.0020	.0031
6	0.	0.	0.	0.	0.	0.	.0001	.0002	.0003	.0005
7	0.	0.	0.	0.	0.	0.	0.	0.	0.	.0001

x	λ = 1.50	2.00	2.50	3.00	3.50	4.00	5.00	6.00	8.00	10.0
0	.2231	.1353	.0821	.0498	.0302	.0183	.0067	.0025	.0003	0.
1	.3347	.2707	.2052	.1494	.1057	.0733	.0337	.0149	.0027	.0005
2	.2510	.2707	.2565	.2240	.1850	.1465	.0842	.0446	.0107	.0023
3	.1255	.1804	.2138	.2240	.2158	.1954	.1404	.0892	.0286	.0076
4	.0471	.0902	.1336	.1680	.1888	.1954	.1755	.1339	.0573	.0189
5	.0141	.0361	.0668	.1008	.1322	.1563	.1755	.1606	.0916	.0378
6	.0035	.0120	.0278	.0504	.0771	.1042	.1462	.1606	.1221	.0631
7	.0008	.0034	.0099	.0216	.0385	.0595	.1044	.1377	.1396	.0901
8	.0001	.0009	.0031	.0081	.0169	.0298	.0653	.1033	.1396	.1126
9	0.	.0002	.0009	.0027	.0066	.0132	.0363	.0688	.1241	.1251
10	0.	0.	.0002	.0008	.0023	.0053	.0181	.0413	.0993	.1251
11	0.	0.	0.	.0002	.0007	.0019	.0082	.0225	.0722	.1137
12	0.	0.	0.	.0001	.0002	.0006	.0034	.0113	.0481	.0948
13	0.	0.	0.	0.	.0001	.0002	.0013	.0052	.0296	.0729
14	0.	0.	0.	0.	0.	.0001	.0005	.0022	.0169	.0521
15	0.	0.	0.	0.	0.	0.	.0002	.0009	.0090	.0347
16	0.	0.	0.	0.	0.	0.	0.	.0003	.0045	.0217
17	0.	0.	0.	0.	0.	0.	0.	.0001	.0021	.0128
18	0.	0.	0.	0.	0.	0.	0.	0.	.0009	.0071
19	0.	0.	0.	0.	0.	0.	0.	0.	.0004	.0037
20	0.	0.	0.	0.	0.	0.	0.	0.	.0002	.0019
21	0.	0.	0.	0.	0.	0.	0.	0.	.0001	.0009
22	0.	0.	0.	0.	0.	0.	0.	0.	0.	.0004
23	0.	0.	0.	0.	0.	0.	0.	0.	0.	.0002
24	0.	0.	0.	0.	0.	0.	0.	0.	0.	.0001

Musterlösung

Exam Statistics, summer semester 2021

1.1	☐ A ☐ B ■ C ☐ D ☐ E
1.2	☐ A ☐ B ☐ C ■ D ☐ E
1.3	■ A ☐ B ☐ C ☐ D ☐ E
1.4	☐ A ■ B ☐ C ☐ D ☐ E
1.5	☐ A ■ B ☐ C ☐ D ☐ E
1.6	☐ A ☐ B ■ C ☐ D ☐ E
1.7	■ A ☐ B ☐ C ☐ D ☐ E
1.8	☐ A ☐ B ☐ C ☐ D ■ E
1.9	■ A ☐ B ☐ C ☐ D ☐ E
1.10	■ A ☐ B ☐ C ☐ D ☐ E
1.11	☐ A ☐ B ■ C ☐ D ☐ E
1.12	☐ A ☐ B ■ C ☐ D ☐ E
1.13	☐ A ☐ B ■ C ☐ D ☐ E
1.14	☐ A ☐ B ☐ C ■ D ☐ E
1.15	☐ A ☐ B ☐ C ☐ D ■ E
1.16	☐ A ■ B ☐ C ☐ D ☐ E
1.17	■ A ☐ B ☐ C ☐ D ☐ E
1.18	☐ A ■ B ☐ C ☐ D ☐ E
1.19	☐ A ☐ B ■ C ☐ D ☐ E
1.20	☐ A ☐ B ■ C ☐ D ☐ E
1.21	☐ A ☐ B ■ C ☐ D ☐ E
1.22	☐ A ☐ B ■ C ☐ D ☐ E
1.23	☐ A ☐ B ☐ C ■ D ☐ E
1.24	☐ A ■ B ☐ C ☐ D ☐ E
1.25	☐ A ☐ B ☐ C ■ D ☐ E
2.1	☐ A ☐ B ☐ C ■ D ☐ E
2.2	☐ A ■ B ☐ C ☐ D ☐ E
2.3	☐ A ☐ B ☐ C ■ D ☐ E
2.4	☐ A ☐ B ☐ C ■ D ☐ E
2.5	☐ A ☐ B ■ C ☐ D ☐ E