Chair of Decision Sciences & Systems
Department of Informatics
Technical University of Munich

Personal sticker

S5506

Compliance to the code of conduct
I hereby assure that I solve and submit this exam myself under my own name by only using the allowed tools listed below.

Signature or full name if no pen input available

Business Analytics: Preparatory Exam

Exam:	IN2028 / Mock	**Date:**	Monday 1st February, 2021
Examiner:	Prof. Dr. Martin Bichler	**Time:**	08:00 – 23:59

Working instructions

- This exam consists of **8 pages** with a total of **3 problems**.
  Please make sure now that you received a complete copy of the exam.
- The total amount of achievable credits in this exam is 3 credits.
- Detaching pages from the exam is prohibited.
- Allowed resources: The use of lecture notes, books, dictionaries, notes, exercise sheets, etc. during the exam is permitted. It is also permitted to use a calculator.
- Subproblems marked by * can be solved without results of previous subproblems.
- **Answers are only accepted if the solution approach is documented.** Give a reason for each answer unless explicitly stated otherwise in the respective subproblem.
- Do not write with red or green colors nor use pencils.

Left room from _____ to _____ / Early submission at _____

Code of Conduct

Please note: The correct completion and submission of this code of conduct exercise is a mandatory requirement for passing the exam for the module IN2028. Please read the following carefully, fill in the required text and images and sign the document as requested. Then scan this complete document or transfer it electronically as a PDF according to the rules laid out in the following and submit it at the TUMexam submission platform.

The following rules apply to all participants in the examination for the module IN2028 in the form of a one-time remote exercise:

- Each participant completes the one-time remote exercise and this preparatory exercise by herself or himself, without the help of other people and using only the allowed tools.
- Each participant uses the same media (e. g. pen and paper or tablet with pen input, but not a combination of these) for both this preparatory exercise and the one-time remote exercise.
- The exam is open book. The use of lecture notes, books, dictionaries, notes, exercise sheets, etc. during the exam is permitted. It is also permitted to use a calculator.
- It is *forbidden* to use any hints or sample solutions communicated by other participants, students, or any other persons.
- It is *forbidden* to pass on any information to or discuss questions relating to the one-time remote exercise (e. g. sample solutions, hints, problem statements) with any other person or to publish them in any way (internet, messaging apps, WhatsApp, Facebook, written or oral transmission, etc.). Please note that passing on problem statements is a violation of the copyright and we reserve the right to press legal charges in such a case.
- Each participant is responsible for ensuring that the examination documents he or she uploads to the TUMexam submission platform are complete and correspond to the original. In particular, only the solution sheet that has been individually assigned to the respective participant and downloaded via an individual TUMexam URL may be used. The only exception to that is individual sheets prepared by printing out a PDF file supplied on the Moodle course site—no other individual paper may be used! You may *not* pass your TUMexam download to any other persons. It is*forbidden* to hand in the same page more than once. The layout of the pages downloaded from TUMexam *must not* be changed in any way. In particular, it is *forbidden* to embed more than one page of the download on the same page of your submission and it is forbidden to modify the page margins or the page format in any way.
- Each participant agrees to keep the original (paper or digital copy) of his or her submission for at least 6 months after the examination date and to make it available to the examiner upon request.
- Each participant is aware that any violation of these rules constitutes an attempt at deception and that such behavior automatically leads to a failing grade according to §22 of the General Examination and Study Regulations for Bachelor's and Master's Programs at the Technical University of Munich (APSO). In accordance with §22 APSO, the respective examination committees may also decide on further disciplinary measures which may, under certain circumstances, result in exclusion from all further examinations and exclusion from further studies.
- In particular, the following are regarded attempts at deception:
    1. the submission of a solution sheet which is not assigned to he respective participant,
    2. the submission of a solution that can be clearly assigned to a problem on some different examination sheet (note that your exam problems may contain randomized elements or several groups with different problem statements),
    3. any form of help by or communication with another person during the one-time remote exercise, with the exception of supervisory staff,
    4. the communication or discussion of solutions, information, hints or problems statements relating to the one-time remote exercise during examination time (including the upload period)
    5. the use of different media for this preparatory exercise and for the one-time remote exercise

By submitting your solution through the TUMexam submission platform you confirm that

- you were medically fit to participate in the exercise during the time of examination,
- were not affected by any extraordinary events during the time of examination,
- have kept to the time limits of the examination,
- understood and followed the principles laid out above,
- agree to the processing and storage of your data and submission as necessary for the processing and grading of the examination.

In order to be allowed to take part in the one-time remote exercise in this class, you must reach all credits in this preparatory exam. Use the space provided on this sheet to fill in your solutions and provide further documents.

Problem 1 Confirm Code of Conduct (1 credit)

Write down the following statement verbatim in your own handwriting (notable deviations in the handwriting here and in the one-time remote exercise will be considered an attempt at deception). Add today's date and sign the statement.

0
1

I hereby confirm that I have read and understood the Code of Conduct on the previous page and will comply with all specified rules. In particular, I am aware that any violation on my part may result in sanctions, ranging from failing this examination to termination of my study program and ex-matriculation from TUM.

(Date) (Signature)

I hereby confirm that I have read and understood the Code of Conduct on the previous page and will comply with all specified rules. In particular, I am aware that any violation on my part may result in sanctions, rangi

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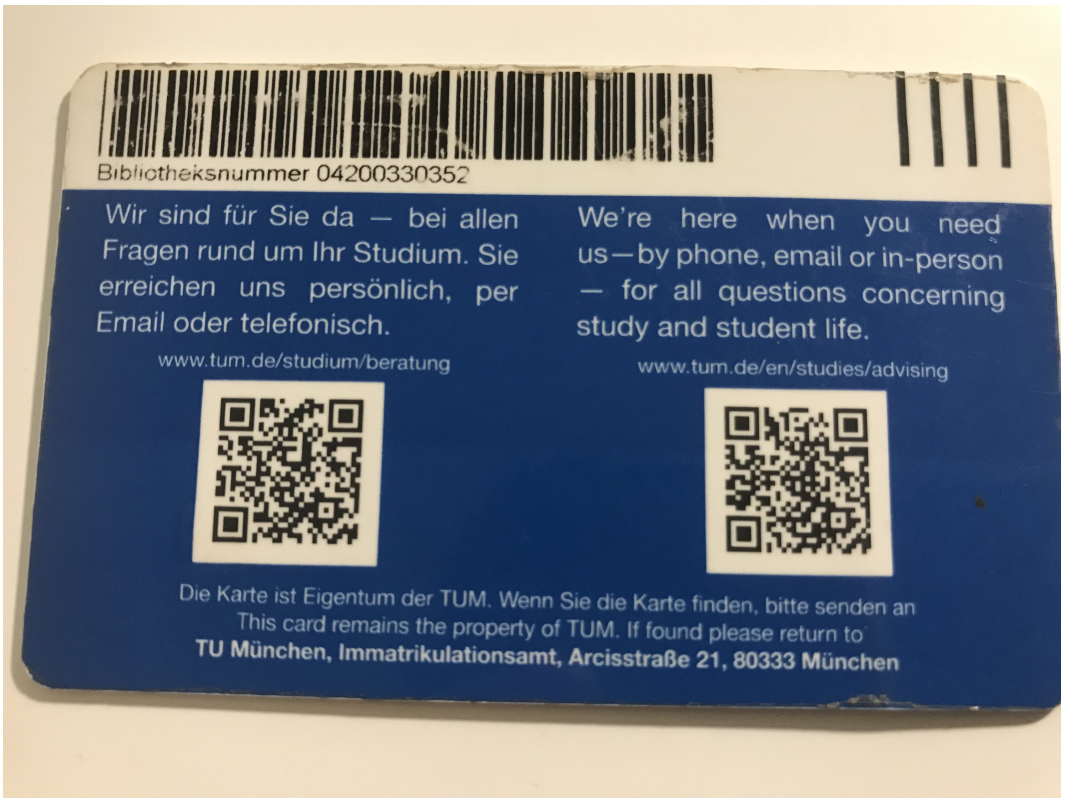
Problem 2 Photo ID (2 credits)

For identification, we ask you to submit a copy of some official photo identification document. Accepted Documents include TUM StudentCard, a passport, a residence permit with photo or a driver's license. If you do not use StudentCard or if your StudentCard does not carry a current validation, please also include a copy of your certificate of matriculation which can be downloaded on your TUMonline account.

0 1 a) Scan or photograph the **front** (the side containing the photo) of an official photo identification document as described above. If you are using pen and paper, when scanning the solution sheet, place your ID document in the appropriate place on the solution sheet. If you are using an electronic device for processing, first digitize the front of the ID document (for example, by photographing it) and then insert it into the solution sheet.

b) Insert the **back** (the side on the back of the one containing the photo) of the ID document from the previous subproblem. If you are using pen and paper, when scanning the solution sheet, place your ID document in the appropriate place on the solution sheet. If you are using an electronic device for processing, first digitize the back of the ID document (e. g. by taking a photograph) and then insert it into the solution sheet. If applicable, please also add your certificate of matriculation here.



Problem 3 **Naive Bayes (0 credits)**

This is an example of a possible real exam exercise. In this preparatory exercise, it is *optional* to complete Problem 3. In the real exam, this problem would be worth around 10 credits. (Where a 90 minute exam has 90 credits.)

a) What are the main assumptions of Naive Bayes classifiers?

- assumes independence between predictor variables

Table 3.1 contains seven instances on credit score data, where **Score** is the binary class attribute.

Status of checking account	Purpose	Housing	Score
0 - 200	car	rent	good
no account	business	own	good
negative	car	rent	bad
negative	business	own	good
0 - 200	car	for free	bad
no account	business	own	good
0 - 200	business	for free	bad

Table 3.1: Credit score data

b) Use a Naive Bayes model to *classify* the instance in Table 3.2. Explicitly state all probabilities you have used in the calculation (e.g., $P(housing = own | score = good) = x$).

Status of checking account	Purpose	Housing	Score
no account	car	own	?

Table 3.2: Unclassified credit score instance

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Additional space for solutions–clearly mark the (sub)problem your answers are related to and strike out invalid solutions.