

TUMexam

Backend Manual

10th July, 2024

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1 How do submissions via TUMexam work?

TUMexam offered an online review system for written examinations for many years, which has now been replaced by a new interface that also allows to download examination templates (problem statements) and subsequently submit scanned or digitally edited versions of those exams. TUMexam therefore became a platform that supports both remote and on-site examinations as well as homework submissions. A supervision of remote exams is possible through third party tools such as *BigBlueButton*¹.

The features for (optional) online reviews of exams are fully integrated into our new submission platform.

1.1 Concept

A submission goes through multiple steps that are visualized in Figure 1.1. The working period corresponds to the time frame you are allowed to take an exam, i. e., filling solutions. For homeworks that time frame may be multiple days. For a written exam it may be, for instance, 90 min.

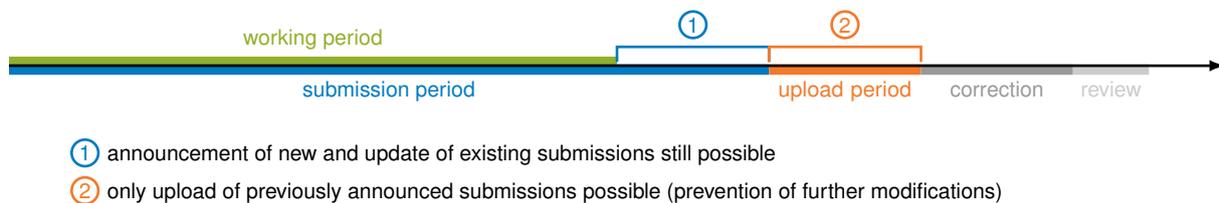


Figure 1.1: Different steps of a submission (release to correction)

The submission period is the time frame within which TUMexam accepts a *new or modified* submission. In particular for written exams, it should be an extension over the working period to give you enough time to scan your working sheets and *announce* the upload on the submission page. This extension is marked by ① in Figure 1.1.

i The extension ① is, technically speaking, not different from the working period. It is the additional time the examiner grants you to prepare your documents for upload and hit the *Upload* button. It is our recommendation that at the beginning of this time, you immediately start preparing your documents and you upload a first version of them. In case you complete the upload process and find that you have remaining time, you are free to use this time to improve your solution and upload again. Of course it is your decision whether you follow this recommendation or not. However, we strongly advice you to start preparing your documents early since late submissions are not accepted.

It is not necessary that the upload completes within ① but merely that the submission is announced to TUMexam. This works as follows:

1. When to click *Upload* on the submission page, cryptographic checksums of your documents are calculated locally on your computer and submitted to the server. The server then assigns you a position in the upload

¹<https://bbb.rbg.tum.de> (The RBG instance of BBB requires an account at the Departments of Informatics or Mathematics)

queue before the actual upload begins. If you change anything in your documents, the checksums will change.

2. Once the server receives the checksums, the submission is *announced*, i. e., you may restart the upload of the exact same documents at any time until the upload period ② has ended. For instance, if your computer crashes while waiting for the upload to finish, you may simply select the same files and start the upload again.
3. Within the whole submission period, you may discard an old submission at any time by uploading new files. Once the submission period has ended, new documents are no longer accepted.

⚠ Your submission *must be announced* to the server until the end of the *submission period*. Modifications after that deadline are then detected due to changes of checksums and rejected.

During submission of homeworks you probably never notice that the server assigns you a position in the upload queue. However, during an exam with severely limited time, we expect a high number of submissions within a couple of minutes. In this case, the submission frontend will display the position in the waiting list, which is updated at least once every 25 s. Do *not* reload the submission page while waiting for the upload.

i Comparing the process to an exam written on-site, the *working period* corresponds to the regular time to solve problems just as if you were in a lecture hall. Early submissions are possible at any time. The time interval ① that the *submission period* extends over the *working period* is somehow comparable to the time it takes to collect exams on-site. Although forbidden in many cases, supervisors have a hard time to keep you from continue solving problems while the exams are collected. For remote exams, we do not even try to do that but explicitly warn you that any new or modified submissions after the submission period has ended are rejected.

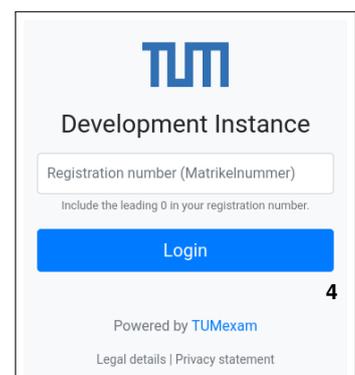
1.2 Login and upload

The submission system is only accessible via *personal links* that are either published in TUMonline or Moodle. In some cases, the link may be sent via email, e. g. if you do not have access to TUMonline for some reasons.

⚠ Do never share your personal link with others. It associates you with all examinations of the respective lecture (homeworks, exams, etc.).

i The screenshots in this document may be based on preliminary versions of the submission system. Therefore, they may differ in details but should give a rather good impression.

With this link you reach the login screen of the submission frontend. It asks you to enter your matriculation number (including the leading zero). This is not meant as an additional security factor. Security solely lies in the personal link which is virtually impossible to guess. However, there are some cases where this link



TUM

Development Instance

Registration number (Matrikelnummer)

Include the leading 0 in your registration number.

Login

Powered by TUMexam

Legal details | Privacy statement

cannot be published in Moodle (e. g. for pupils starting early at TUM). In such cases, the link may be sent via email and an additional passphrase (instead of the matriculation number) may be agreed on. This gives us the flexibility to serve students without access to official TUM platforms.

After login you see an overview of all examinations in the given lecture, which may be homeworks, programming tasks, written examinations and, of course, also examinations that take place on-site only and listed here only for the purpose of online reviews. When you select an examination, you reach a subpage that – depending on the current state of the exam – allows to download the problem statement, accepts submissions, is disabled since grading is in process, allows the online review, or just gives you the possibility to download the corrected exam and an optional solution proposal.

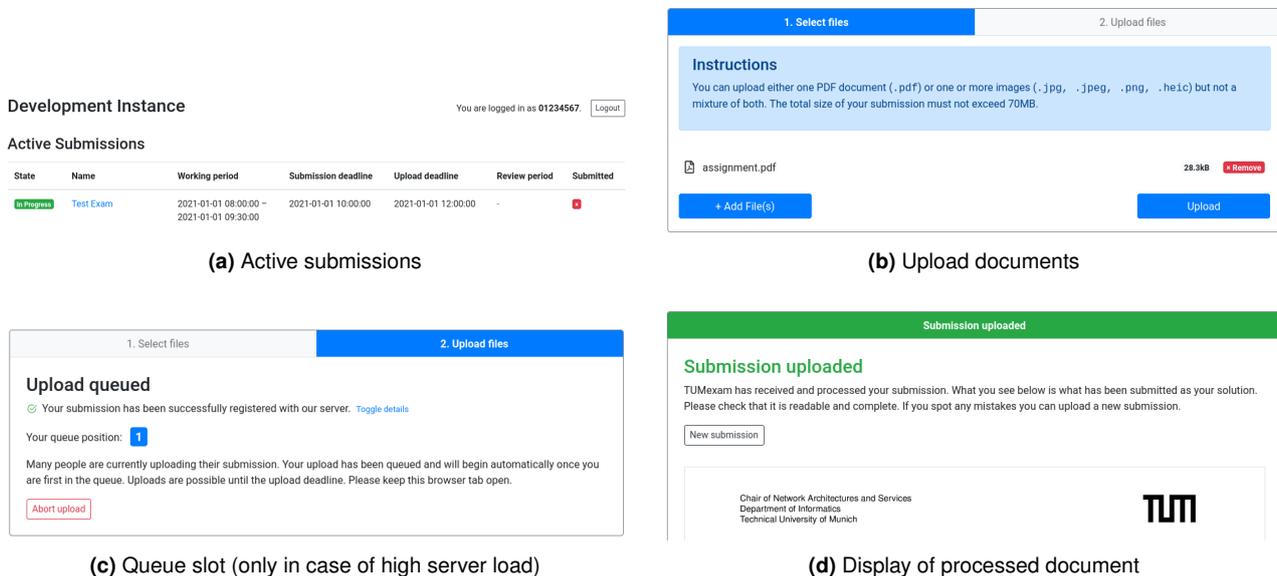


Figure 1.2: Submission process

2 Editing submissions

In general, you have the freedom to either edit the exam template digitally on a computer or tablet, or to print it, write on it as you would do on-site, and then digitalize it again. In the following we discuss both options and give hints for applications for all major operating systems how to efficiently edit and digitalize your submissions.

2.1 Digital editing

We recommend to solve the exam on your computer or tablet whenever possible. If you have a printer and a scanner (preferably with an automated document feeder), the analog way is probably a good alternative. Even a smartphone may be used as scanner. However, it requires some practicing to scan documents using the camera of your mobile phone. See Section 2.4 for details.

TUMexam templates now offer text input forms that allow you to enter text using a keyboard. Depending on the problem statement, additional editing options such as marking areas or drawing geometric shapes may be required. The most convenient way for that is probably pen input, allowing you to write the exam as you are used to. There are, however, different PDF applications available for all major operating systems that allow for easy annotation of PDF files even without pen input. If you are forced to use your keyboard as primary input, you may use \LaTeX pseudocode such as $\sum_{i=1}^N = N*(N+1)/2$, which is not typeset but can be read and understood by correctors.

i It is important to know that TUMexam relies on the processing of images (JPEGs), not PDF files. We therefore convert a submitted PDF page by page. This precludes specific types of annotations such as comments that are saved in the PDF and only become visible when you click on them. For the same reason, text in input forms must be completely visible and must not extend over the limits of the text box. Figure 2.1 illustrates both cases.

⚠ Important: Some PDF editors (e. g. Preview under macOS or Google Chrome) that use proprietary PDF extensions that cannot be processed correctly. The result are vanishing text inputs after uploading your submission to TUMexam.

The simple workaround is to **print** the document to PDF, i. e., open the printing dialog in your editor and select “save as PDF”.

2.2 Recommended applications for digital editing

The following list of recommended applications for digital editing is not complete. But it should give you a good starting point. You are free to use different programs, but you should test them before an examination to ensure compatibility. It is important, that you find a personal and efficient way to edit the exams.

a)* Geben Sie die Kapazität der Festplatte in TiB an.

Lorem ipsum dolor sit amet, consetetur sadipscing elitr, sed diam nonumy eirmod tempor invidunt ut labore et dolore magna aliquyam erat, sed diam voluptua. At vero eos et accusam et justo duo dolores et ea rebum. Stet clita kasd gubergren, no sea takimata sanctus est Lorem ipsum dolor sit amet. Lorem ipsum dolor sit amet, consetetur sadipscing elitr, sed diam nonumy eirmod tempor invidunt ut labore et dolore magna aliquyam erat, sed diam voluptua. At vero eos et accusam et justo duo dolores et ea rebum. Stet clita kasd gubergren, no sea takimata sanctus est Lorem ipsum dolor sit amet.



(a) Correct input for a text field

a)* Geben Sie die Kapazität der Festplatte in TiB an.

Lorem ipsum dolor sit amet, consetetur sadipscing elitr, sed diam nonumy eirmod tempor invidunt ut labore et dolore magna aliquyam erat, sed diam voluptua. At vero eos et accusam et justo duo dolores et ea rebum. Stet clita kasd gubergren, no sea takimata sanctus est Lorem ipsum dolor sit amet. Lorem ipsum dolor sit amet, consetetur sadipscing elitr, sed diam nonumy eirmod tempor invidunt ut labore et dolore magna aliquyam erat, sed diam voluptua. At vero eos et accusam et justo duo dolores et ea rebum. Stet clita kasd gubergren, no sea takimata sanctus est Lorem ipsum dolor sit amet. Lorem ipsum dolor sit amet, consetetur sadipscing elitr, sed diam nonumy eirmod tempor invidunt ut labore et dolore magna aliquyam erat, sed diam voluptua. At vero eos et accusam et justo duo dolores et ea rebum. Stet clita kasd gubergren, no sea takimata sanctus est Lorem ipsum dolor sit amet.

Duis autem vel eum iriure dolor in hendrerit in vulputate velit esse molestie consequat, vel illum dolore eu feugiat nulla facilisis at vero eros et accumsan et iusto odio dignissim qui blandit praesent luptatum zzril delenit augue duiis dolore te feugait nulla facilisi. Lorem ipsum dolor sit amet, consetetur adipiscing elit, sed diam nonumy nibh euismod tincidunt ut laoreet dolore magna aliquam erat voluptua.



(b) Incorrect input: the text not visible here is lost when converting the page

a)* Geben Sie die Kapazität der Festplatte in TiB an.



(c) Incorrect input: the text saved within notes is not visible and is thus lost when converting the page to an image

Figure 2.1: Examples for correct and incorrect text input

 You must not convert the supplied PDF files into different formats such as OpenOffice or Microsoft Word. Even if converted back to PDF, it would probably destroy the layout and credit boxes or codes would no longer be at the expected positions. Such submissions are likely to be impossible to process.

2.2.1 macOS

Preview is an application integrated into macOS and thus free of charge. Native text input fields are supported as well as highlighting and drawing. Please note the official documentation².

⚠ Important: PDFs saved on macOS cannot be processed by TUMexam due to proprietary layers in the PDF (text input disappears). The simple workaround is to either **export** the PDF by clicking “File” / “Ablage” → “Export” / “Exportieren” or to **print** the document to PDF.

- ✓ built-in PDF application
- ✓ supports native text input fields
- ✓ supports highlighting and drawing
- ✓ no additional charge

Skim is a free PDF viewer for macOS. It only supports native text input fields. Drawing is not possible, which is why we assume that it is less useful here.

- ✓ free of charge (can be installed via *Homebrew cast*)
- ✓ supports native text input fields
- ✗ no pen input

Foxit Reader is a PDF viewer and annotator available free of charge. A significant feature is that text super- and subscripts are possible using keyboard input only, which can be useful for math input.

- ✓ supports pen input and free-hand drawing
- ✓ support highlighting
- ✓ free of charge
- ✗ no support for native text input fields

2.2.2 Windows

Edge Browser is the default web browser shipped with Windows 10. Surprisingly, it offers diverse options for editing PDF files: it supports the native text input fields as well as pen input and free-hand drawings. During our tests, we had the impression that the user interface was a bit sluggish, but that may have been due to virtualisation of Windows.

²<https://support.apple.com/de-de/guide/preview/prvw11580/mac>

⚠️ Checking boxes does not work as expected: although no checkmark is visible, it seems to be saved in the PDF. Therefore, do not use your mouse to check boxes but rather draw a cross as you would do with a pen.

- ✓ supports native text input fields
- ✓ supports highlighting
- ✓ supports pen input and free-hand drawing
- ✓ no additional charge
- ✗ checkboxes do not work correctly
- ✗ user interface may be a bit sluggish

Drawboard PDF is a third-party PDF annotator for Windows that supports text input fields as well as pen input. As of May 20, 2020 a free version³ of Drawboard is available.

- ✓ supports native text input fields
- ✓ supports highlighting
- ✓ supports pen input and free-hand drawing
- ✗ payware (free essentials version available)

Adobe Acrobat Reader is the free PDF viewer offered by Adobe. It only supports the native text input fields. Since no other input options are available, we assume that it is of less importance.

- ✓ supports native text input fields
- ✓ free of charge
- ✗ no other input methods available

Foxit Reader is a PDF viewer and annotator available free of charge. A significant feature is that text super- and subscripts are possible using keyboard input only, which can be useful for math input.

⚠️ Test this annotator beforehand in a demo exam! There is a problem resulting in vanished problem statements we were unable to reproduce so far.

- ✓ supports pen input and free-hand drawing
- ✓ support highlighting
- ✓ free of charge
- ✗ no support for native text input fields
- ✗ must be tested beforehand

³<https://www.drawboard.com/blog/drawboard-pdf-essentials-now-free>

2.2.3 iOS / iPad

Goodnotes is, according to our experience, the best application to write on PDFs as if they were a piece of paper. It offers virtually all options you have when writing on real paper. Saving and exporting documents is easy and works flawlessly with the submissions system. Unfortunately, it is not free of charge.

- ✓ very good for handwritten annotations
- ✓ supports any kind of highlighting
- ✗ no support for native text input fields
- ✗ payware

Notability is an alternative to Goodnotes, which is also not free of charge.

- ✓ similar feature set to Goodnotes
- ✗ no support for native text input fields
- ✗ payware

iOS PDF Editor is integrated into the “Files” app of iOS and thus free of charge. It offers a similar feature set to Goodnotes and Notability, but working in documents does not feel as good as in those third party applications.

Note: it does not differentiate between pen and finger input, i. e., to scroll in the document you have to use gestures using multiple fingers.

- ✓ good input options
- ✓ highlighting possible
- ✓ free of charge (app integrated into iOS)
- ✗ no support for native text input fields

Foxit Reader is a PDF viewer and annotator available free of charge. A significant feature is that text super- and subscripts are possible using keyboard input only, which can be useful for math input.

- ✓ supports pen input and free-hand drawing
- ✓ support highlighting
- ✓ free of charge
- ✗ no support for native text input fields

⚠ You should *avoid* the following applications:

- ✗ **OneNote App** The OneNote app on iOS does not implement a page break mechanism, thus you would have to take care of that yourself. If you don't do this, your submission will contain *all* pages in a single image, making it impossible for the backend to recognize the page codes. Do *not* use OneNote.

2.2.4 Linux

Xournal may be the best PDF application for this use case under Linux. It allows drawing even without pen input – either by drawing freehand with a mouse or by using geometric shapes. In addition it allows to insert images. The only disadvantage is that text input fields are not directly supported, i. e., you have to enter text using the text input feature of Xournal instead of simply clicking into a solution box.

- ✓ supports input by pen, mouse, and keyboard
- ✓ offers functions to highlight areas in a PDF
- ✓ allows to insert images
- ✓ free and open source
- ✗ no support for native text input fields

Evince is primarily a PDF viewer, which supports native text input fields just like Acrobat Reader for Windows. In addition, it allows to highlight text. However, these markings cannot be freely placed. PDFs cannot be edited in other ways, which is why we assume that Evince is less suitable.

- ✓ supports native text input fields
- ✓ allows to highlight text
- ✓ free and open source
- ✗ no pen input and no free-hand drawing possible

Foxit Reader is a PDF viewer and annotator available free of charge. A significant feature is that text super- and subscripts are possible using keyboard input only, which can be useful for math input.

- ✓ supports pen input and free-hand drawing
- ✓ support highlighting
- ✓ free of charge
- ✗ no support for native text input fields

2.3 Editing on paper

As an alternative, you may print your exam, solve the problems on paper as you are used to, digitalize (scan or photograph) it, and submit it.

 At the moment, the submission **must** be the template provided to you. It is **not** possible to use arbitrary paper.

To scan the submission, you should use a scanner if possible, but there are alternatives: you may use applications on your smartphone to create sufficiently good document scans that fulfill the following criteria:

- scans must be free of perspective distortions, i. e., you must not submit skewed images
- pages must be **complete**, all three codes must be clearly visible
- pages must not have an additional border (in particular not the surrounding table)

2.4 Recommended application to scan documents

Some examples of smartphone apps you may use to scan your documents are listed below. The list is not meant to be complete. If you have additional suggestions, feel free to write us at support@tumexam.de with a short description and advantages/disadvantages of the respective application.

2.4.1 Android

OfficeLens is a free app by Microsoft to scan documents. It automatically recognizes a sheet of paper on a desk and removes the background. However, it requires some practicing to make suitable scans without skewing. Scanned documents can be saved as PDF in the file system of your smartphone or on Google Drive and uploaded to TUMexam from there.

- ✓ automatic recognition of documents with background removal
- ✓ few perspective distortions when used with care
- ✓ pages can be combined as PDF and uploaded
- ✓ free of charge
- ✗ requires some practicing

2.4.2 iOS

Notes is included in iOS / iPadOS. Up to date versions support a convenient way to scan documents page by page. Note that you may have to decrease the resolution of images since documents with eight pages and more may exceed the upload limit of TUMexam. See the official Apple website for more information: <https://www.icloud.com/notes/062g2ryNb-f1YBb1pe1tR9tBA>

- ✓ quick scan of multiple pages
- ✓ generates multi-page PDFs
- ✓ free of charge
- ✗ requires some practicing, in particular how to access the scanned document as PDF

Genius Scan is a well-performing scanner app for iOS. The basic version is free of cost and should be sufficient for scanning exams. Documents can easily be exported as PDF. However, it is important to disable the post-processing filters.

- ✓ pretty good results if filters are disabled
- ✓ document can be exported as PDF
- ✓ basic version is free

 The post-processing filters must be disabled under settings → General → Default filter → None

Notes is integrated into the Notes app of iOS. Since iOS 13, it includes a feature to scan documents. The results are pretty good. Unfortunately, exporting the PDF results in a white border which may cause issues during image recognition.

- ✓ pretty good results
- ✓ few perspective distortions
- ✓ document can be exported as PDF
- ✓ free of charge (integrated into iOS)
- ✗ additional white borders during PDF export cause trouble during image recognition
- ! available since iOS 13

Notes: the document scanner can be reached via the “Files” app

⚠ You should *avoid* the following applications:

- ✗ **CamScanner** The CamScanner app uses image postprocessing that tends to remove page codes and decrease image quality—the results look like a fax and cannot be processed by our backends. Do *not* use CamScanner.

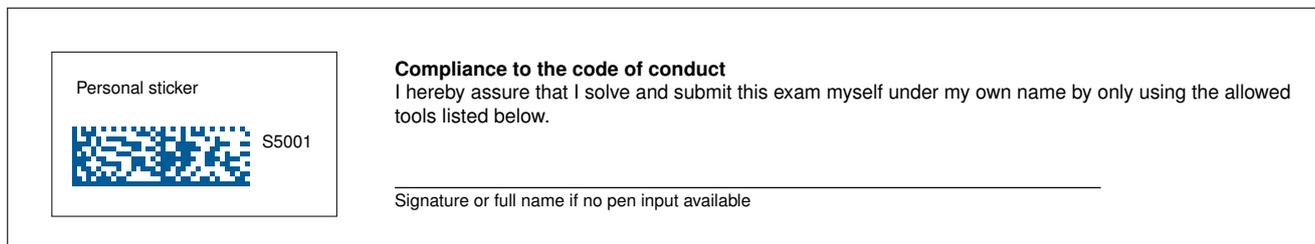
3 Code of conduct und signature

i Please note that details regarding that code of conduct may slightly differ from examiner to examiner. If there are no different instructions provided, use the following information as a baseline.

For remote examinations and on-site examinations without attendee control, you **are required** to provide a signature on the title page. With that signature you assure that

- you solve the the problems of the respective examination yourself,
- you solely use the allowed tools listed on the title page, and
- you submit the exam for yourself.

Figure 3.1 shows the signature field at the top of the title page of your exam.



Personal sticker

S5001

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

Figure 3.1: Example for the signature field on the titlepage of an exam

If you do not sign this field as required, your exam will not be graded. We point out that violations against this code of conduct may have severe consequences, e. g. failing the respective examination or even being excluded from your course of study.

i If you are allowed to take the exam remotely without pen input, please enter your full name by keyboard instead of the signature. In those cases we consider your name as proof that you read and understood the rules.

4 What you must not do

This section illustrates some of the common mistakes made during submissions. The subsequent pages shows some examples of problematic submissions. Of course the subsequent pages do not contain a complete list of possible mistakes.

Problematic submissions cannot be handled by the automated TUMexam process, but require time-consuming manual handling and decision making whether or not the submission is considered to be a submission of sufficient quality.

While some less severe problematic submissions (minor problems) can be handled by your examiner, more severe problematic submissions (major problems) cannot be handled by your examiner but would need be handled in an even more time-consuming process by the TUMexam team. We therefore ask you to make a strong effort to avoid problematic submissions.

In case of less severe problematic submissions that can be handled by your examiner, it will be decided by your examiner whether or not she considers this submission to be of sufficient quality. In case of a more severe problematic submissions that required manual handling by the TUMexam team, the TUMexam team will make the submission accessible to the examiner together with an assessment whether or not the submission is considered to be of sufficient quality, and whether the cause of the problem is assumed to be in the responsibility of the student.

According to our experience up to now, the large majority of students had no problem in uploading submissions of sufficient quality. About 98% of the submissions were automatically processed without any problem. Of the remaining 2%, about 1,3% of the submissions had minor problems an examiner was able to fix easily, while about 0,7% had major problems, of which examples are shown in Figure 4.1.

It is critically important that pages do not contain page codes of other pages. An image like that in Figure 4.1c cannot be processed by TUMexam, as it contains *all* pages of the submission in a single image. This submission was produced using the OneNote app on iPad, which does not implement page breaking and is therefore completely unsuitable for producing valid submissions. Do **not** use the OneNote app!

Aufgabe 3 IPoAC (IP over Avian Carriers) (6 Punkte)

IPoAC (IP over Avian Carriers) ist eine Alternative zum gebräuchlichem Ethernet. Es wurde unter dem RFC 1149 am 1 April 1990 veröffentlicht. Dabei werden die Layer 2 Datenpakete von Hand hexadeciml kodiert auf einen Computer zur Weiterverarbeitung geladen. Dies ist sehr aufwändig. Um mit dem Geist der Zeit zu gehen, sollen im Folgenden die Vorteile gegenüber Ethernet geklärt werden, wenn leistungsstarke USB Sticks verwendet werden.

Um einen USB Stick zu beschreiben und wieder einzulesen, ist eine Serialisierungszeit (t_s) von 256 s einzurechnen. Die USB Sticks haben alle eine Kapazität von 32 GiB. Die Avian Carrier haben eine außerordentliche Ausbreitungsgeschwindigkeit von 120 km/h.

a) Wieviele bit können mit einem USB Stick versendet werden?

32.000.000.000
274879906944 bit

b) Zeigen Sie, dass damit eine höhere Übertragungsrates möglich ist als mit einer durchschnittlich guten 100 Mbit/s Ethernet-Leitung.

$$t_p = \frac{26 \cdot 2144 \text{ bit}}{256} = 1072 \frac{\text{bit}}{\text{s}} \Rightarrow \frac{1072 \text{ bit}}{\text{s}} > 100 \frac{\text{Mbit}}{\text{s}}$$

c) Nachrichten werden über eine Strecke von 50 km verschickt. Bestimmen Sie die Ausbreitungsverzögerung (in Sekunden).

$$t_s + t_p = 256 + 281 \text{ s} = 537 \text{ s}$$

$$t_p = \frac{50000 \text{ km}}{400 \text{ km/h}} = 0,125 \text{ h} = 450 \text{ s}$$

d) Eine 50 GiB Archivdatei über Ethernet (dieselbe Strecke) zu versenden dauert ca. 4300 s. Wie lange dauert es in dem gegebenen Fall mit IPoAC (in Sekunden)?

537 s

Aufgabe 1 Multiple Choice (7 Punkte)

Die nachfolgenden Teilaufgaben sind Multiple Choice Single Answer mit 1 Punkt wenn richtig beantwortet und 0 Punkten sonst.

Hinweise zur Bearbeitung auf Papier bzw. wenn die Ihr PDF-Editor die Ankreuzfunktion nicht unterstützt:

- Kreuzen Sie richtige Antworten an
- Kreuze können durch vollständiges Ausfüllen gestrichen werden
- Gestrichene Antworten können durch nebenstehende Markierung erneut angekreuzt werden

a) Welchem Layer des ISO/OSI Modells ist ICMP zuzuordnen?

- Layer 4: Transportschicht
- Layer 2: Sicherungsschicht
- Layer 3: Vermittlungsschicht
- Layer 1: Physikalische Schicht

b) Wenn einer der PCs in der nebenstehenden Abbildung einen Rahmen an das Notebook (NB) senden will, wessen MAC-Adresse(n) werden verwendet um das Ziel anzugeben?

- NB
- AP und NB
- SW und NB
- AP

c) Wenn einer der PCs in der nebenstehenden Abbildung einen Rahmen an das Notebook (NB) senden will, wessen IP-Adresse(n) werden verwendet um das Ziel anzugeben?

- SW und NB
- AP und NB
- NB
- AP

d) Gegeben sei eine Signalleistung von 16 mW und Rauschleistung von 17 mW. Bestimmen Sie das SNR in dB.

- 0,26 dB
- 0,09 dB
- 0,94 dB
- 0,18 dB
- 0,03 dB
- anderer Wert

e) Gegeben sei das Datum 6x48e5921 in Little Endian. Wie lautet die Darstellung in Big Endian?

- 6x2159e48
- 6x1295e84
- 6x6e41295
- 6x48e6912
- 6x48e65921

f) Gegeben sei eine binäre Nachrichtenquelle, die ein Zeichen mit Wahrscheinlichkeit $p = 0,7999$ emittiert. Bestimmen Sie die Entropie der Quelle.

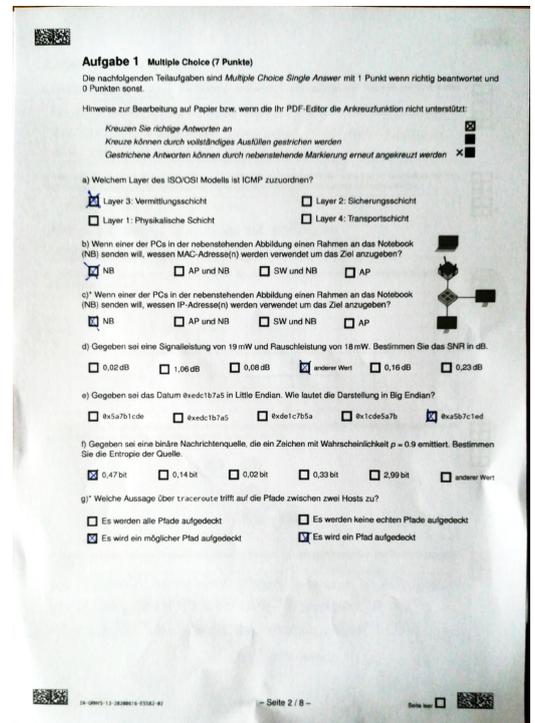
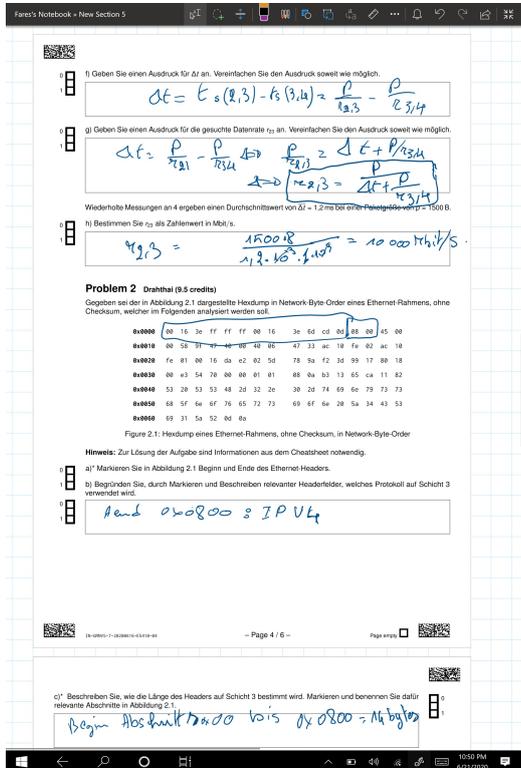
- 0,72 bit
- 0,46 bit
- 0,26 bit
- 1,86 bit
- 0,06 bit
- anderer Wert

g) Welche Aussage über traceroute trifft auf die Pfade zwischen zwei Hosts zu?

- Es werden alle Pfade aufgedeckt
- Es wird ein möglicher Pfad aufgedeckt
- Es wird ein Pfad aufgedeckt
- Es werden keine echten Pfade aufgedeckt

(a) The scan is sharp but skewed such that page codes cannot be recognized.

(b) The scan is skewed, bottom page codes are removed, and it looks like a fax due to post-processing by CamScanner. Do not use that app!



(c) Pages must not contain page codes of other pages. Screenshots like this will be rejected during image processing on our backends.

(d) The text is readable, but page codes are not. Such scans are likely to be rejected.

Figure 4.1: Examples for unacceptable scans – if everyone would submit things like that, it would not work!