A&W

Exam Preparation Session

Nil Ozer

Outline

- Lernphase
- Exam Preparation for A&W
  - Website Explanation

- Mock Exam

- Semester-End celebration (pizza & drinks)

Lernphase

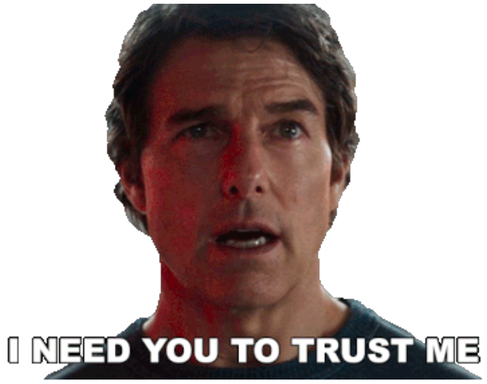
ETH Exams

- You already know, use it !

- Exhausting ! Could be fun :)
- What is “enough” ?
  - How does scale work ?
- Everybody is in the same position as you

Lernphase

Planning

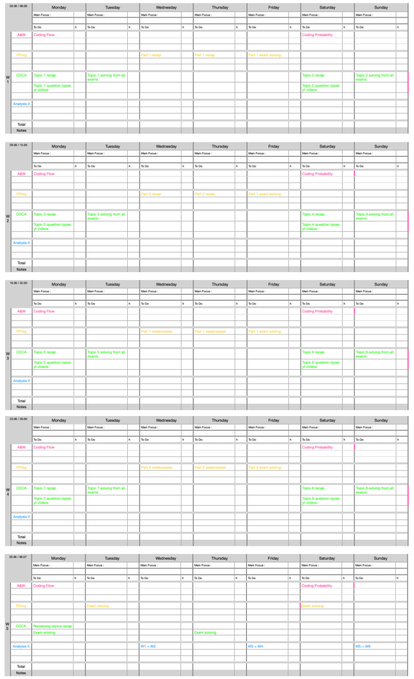


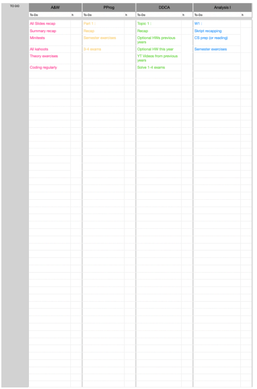
- “Waste” 1-2 days on planning !
  - You are making promises to yourself !

- Relatively , **easy** !
- It’s a long run .

- Interleave the subjects

- My planning looked like …
  - Lernplan template for you !
  - Add/remove





Be aware of your time left at all stages!

Lernphase

Tipps for Analysis I

- Take over and edit an existing cheat sheet
  - Constant work !
  - Don’t waste to much time in the beginning
  - You can also write yours

- Semester exercises !!
  - The book
- Go week by week

- Solve exams !! (focus on imamoglu)

For each weak do :

Analysis I	
To-Do	h
W1 :	
Skript recapping	
CS prep (or reading)	
Semester exercises	

Lernphase

Tipps for DDCA

- Take over and edit an existing cheat sheet (or write one)

- Learn topic by topic
  - Also solve starting from your best in the exam !!

- Then resolve the exams
  - Have complete exam trials

For each topic do :

DDCA	
To-Do	h
Topic 1 :	
Optional HWs previous years	
Optional HW this year	
YT Videos from previous years	
Solve 1-4 exams	

Lernphase

Tipps for PProg

- Written semester exercises !
- Divide to 2 parts
- Old exams !!

For each part do :

PProg	
To-Do	h
Part 1 :	
Recap	
Semester exercises	
3-4 exams	

A&W Exam

I've got you !

Exam

Quiz navigation

Algorithmen und Wahrscheinlichkeiten Klausur

i

Formelsammlung

i

True/False Questions - Part 1

i 1 2 3 4 5 6 7 8 9 10

Algorithms - Part 2

i 11 12

Multiple Choice und Kurzantworten - Part 3

i 13 14 15 16 17

Block Multiple Choice - Part 4

i 18 19 20 21 22

Schriftliche Aufgaben - Part 5

i i i

Java Documentation

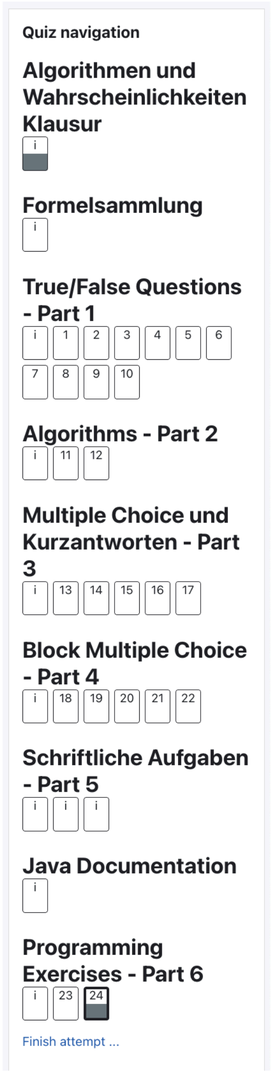
i

Programming Exercises - Part 6

i 23 24

Finish attempt ...

Exam



6 Parts

First 4 parts : each 10 points (similar to minitest)

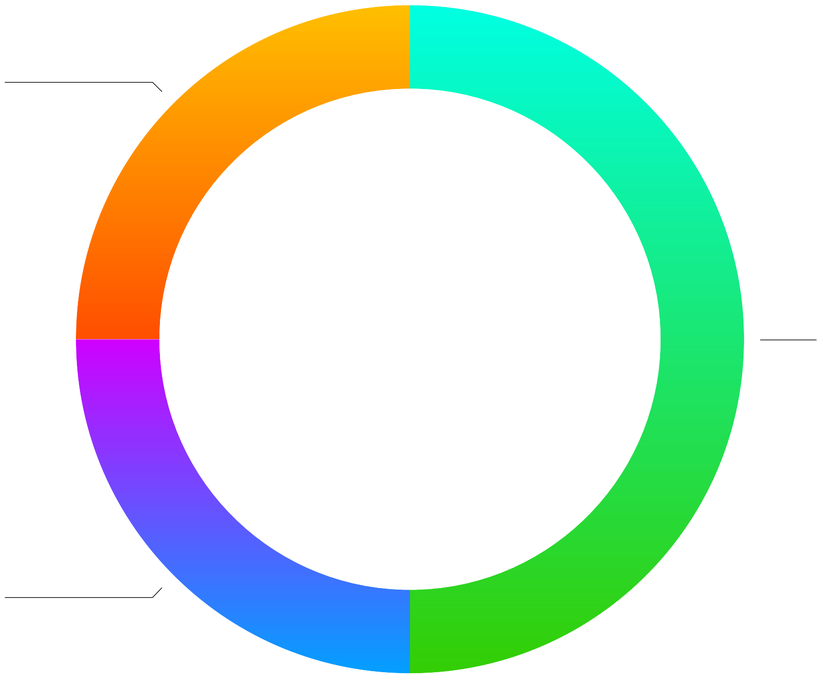
Part 5 : written tasks, 20 points in total (similar to theory exercises)

Part 6 : 2 programming tasks, each 10 points (similar to CodeEx)

Point Distribution

based on mock exam

Written Theory



Moodle

Programming

Quiz navigation

Algorithmen und Wahrscheinlichkeiten Klausur

i

Formelsammlung

i

Exam

Moodle

True/False Questions - Part 1

i 1 2 3 4 5 6 7 8 9 10

Algorithms - Part 2

i 11 12

Multiple Choice und Kurzantworten - Part 3

i 13 14 15 16 17

Block Multiple Choice - Part 4

i 18 19 20 21 22

Written Theory

Schriftliche Aufgaben - Part 5

i i i

Programming

Java Documentation

i

Programming Exercises - Part 6

i 23 24

Finish attempt ...

Mock Exam 2022

Moodle

~1 points

True/False Questions - Part 1

i 1 2 3 4 5 6 7 8 9 10

Algorithms - Part 2

i 11 12

Multiple Choice und Kurzantworten - Part 3

i 13 14 15 16 17

Block Multiple Choice - Part 4

i 18 19 20 21 22

Ein Matching, für das es keinen augmentierenden Pfad gibt, ist inklusionsmaximal.

Select one:

- True
- False

Drei Ereignisse A, B, C heissen unabhängig genau dann wenn $\Pr[A \cap B \cap C] = \Pr[A] \cdot \Pr[B] \cdot \Pr[C]$.

Select one:

- True
- False

Mock Exam 2022

~5 points

Moodle

True/False Questions - Part 1

i | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10

Algorithms - Part 2

i | 11 | 12

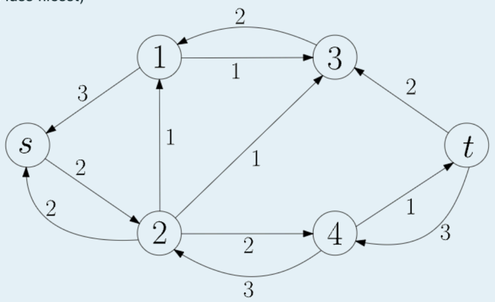
Multiple Choice und Kurzantworten - Part 3

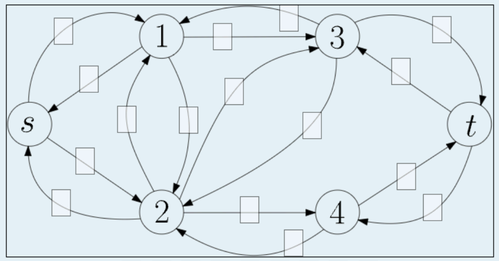
i | 13 | 14 | 15 | 16 | 17

Block Multiple Choice - Part 4

i | 18 | 19 | 20 | 21 | 22

Sei N ein Netzwerk ohne entgegengesetzte Kanten. Betrachten Sie das abgebildete Restnetzwerk R_f. Berechnen Sie den zugehörigen Fluss f und ziehen Sie die Flusswerte auf die entsprechenden Kanten (verwenden Sie die 0 für Kanten, über die kein Fluss fliesst)





1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 0

Mock Exam 2022

~5 points

Moodle

True/False Questions - Part 1

i 1 2 3 4 5 6 7 8 9 10

Algorithms - Part 2

i 11 12

Multiple Choice und Kurzantworten - Part 3

i 13 14 15 16 17

Block Multiple Choice - Part 4

i 18 19 20 21 22

function Metric_TSP_Approximation(G):

1. Finde ein/e (gewichts-)minimale/n/s [ ] × T in G.
2. Sei W die Menge von Knoten in T deren Grad [ ] ×
3. Finde ein/e (gewichtsminimale/n/s [ ] × M von W.
4. Finde ein/e [ ] × S im (Multi-)Graph

- $M \cup G$
- $G \setminus M$
- $M \cup T$
- $(G \setminus T) \cup M$

Mock Exam 2022

~2 points

Moodle

True/False Questions - Part 1

i 1 2 3 4 5 6 7 8 9 10

Algorithms - Part 2

i 11 12

Multiple Choice und Kurzantworten - Part 3

i 13 14 15 16 17

Block Multiple Choice - Part 4

i 18 19 20 21 22

Sei $\Omega = \{-3, -2, 0, 2, 3\}$ ein Laplaceraum und sei ω ein (zufälliges) Elementarereignis in Ω. Berechnen Sie $\mathrm{E}[|\omega|]$.

Answer: ✕

Max wirft 10 faire Münzen. Leider hat er vergessen vorher das Fenster zu schliessen und jede seiner Münzen wird mit Wahrscheinlichkeit p von einer Elster gestohlen (unabhängig von den anderen Münzen).

Was ist die Wahrscheinlichkeit, dass Max wenigstens eine Münze, die Zahl zeigt, behält?

- ✓ $1 - (1 - (1 - p)/2)^{10}$
- ✕ $1 - p^{10}$
- ✕ $5 \cdot (1 - p)$
- ✕ $1 - (1 - p)^{10}/2^{10}$

Mock Exam 2022

Moodle

True/False Questions - Part 1

i 1 2 3 4 5 6 7 8 9 10

Algorithms - Part 2

i 11 12

Multiple Choice und Kurzantworten - Part 3

i 13 14 15 16 17

Block Multiple Choice - Part 4

i 18 19 20 21 22

~2 points

Welche der folgenden Probleme können -- mithilfe von Ideen aus dem Kurs -- als Fluss-Probleme modelliert und gelöst werden?

Richtig	Falsch	
☑	☐	Herausfinden, ob ein bipartiter Graph G ein perfektes Matching hat.
☐	☑	Den längsten Pfad in einem Graph G finden.
☑	☐	Herausfinden, ob ein Graph G 2-Kanten-zusammenhängend ist.
☑	☐	Herausfinden, ob ein Graph G 2-Knoten-zusammenhängend ist.

Seien A, B, C unabhängige Ereignisse. Welche der folgenden Gleichungen sind immer wahr?

Richtig	Falsch	
☑	☐	$\Pr[A \cap B] = \Pr[A] \cdot \Pr[B]$
☐	☑	$\Pr[A] + \Pr[B] \leq \Pr[A \cup B]$
☑	☐	$\Pr[A \mid B \cap C] = \Pr[A \mid B \cup C]$
☐	☑	$\Pr[(A \cup B) \cap C] = (\Pr[A] + \Pr[B]) \cdot \Pr[C]$

Mock Exam 2022

Written Theory

Schriftliche Aufgaben - Part 5

i i i

Zeigen/Widerlegen Sie folgende Aussagen

a) Sei $G = (A \uplus B, E)$ ein regul"arer bipartiter Graph mit $E \neq \emptyset$. Dann ist $|A| = |B|$.

b) Seien X und Y unabh"angige Zufallsvariablen. Dann gilt $\mathbb{E}[\max(X, Y)] = \max(\mathbb{E}[X], \mathbb{E}[Y])$

c) Sei v ein Knoten, der inzident zu mindestens zwei Brücken ist. Dann ist u ein Artikulationsknoten.

jeweils 4 Punkte

on paper

Mock Exam 2022

Programming

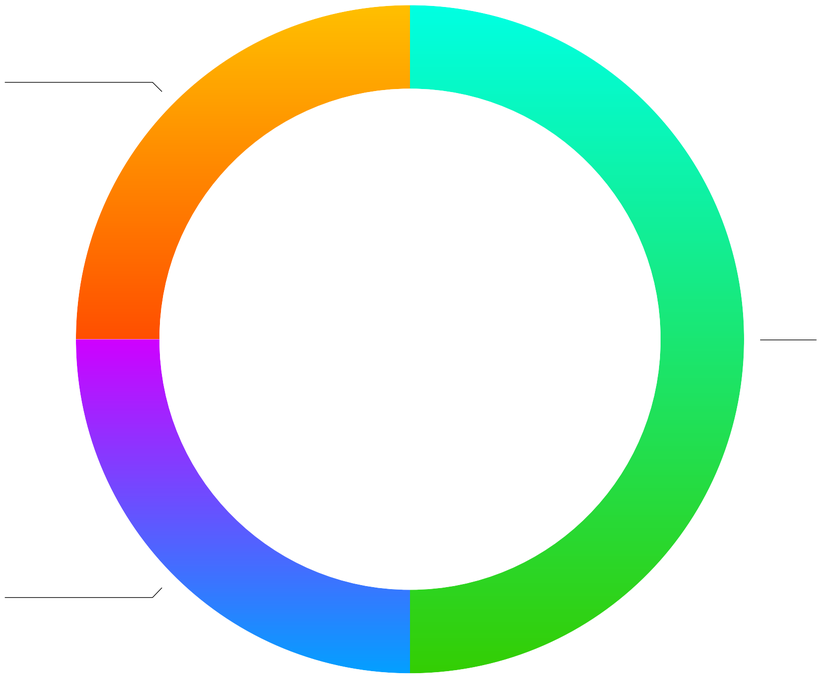
- One probability task
- One flow task

~10 points each

Point Distribution

based on mock exam

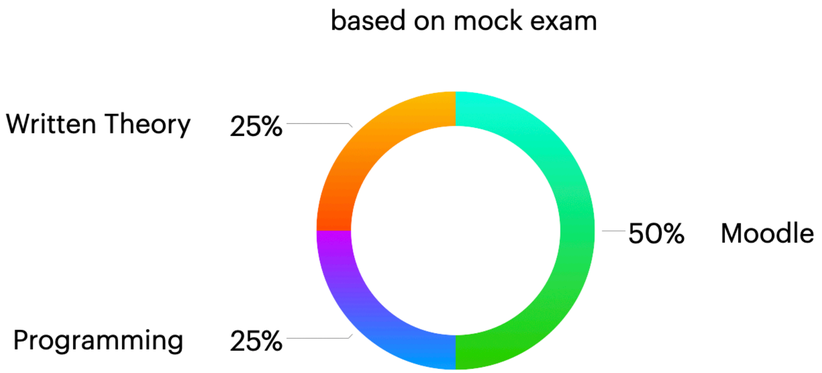
Written Theory



Moodle

Programming

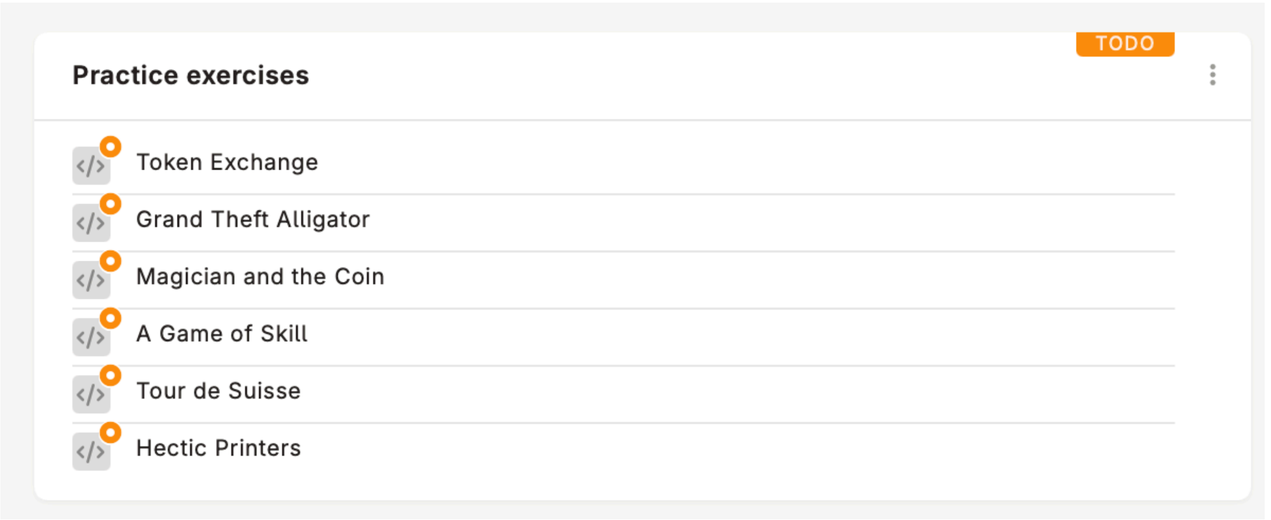
Point Distribution + Weekly Exercises



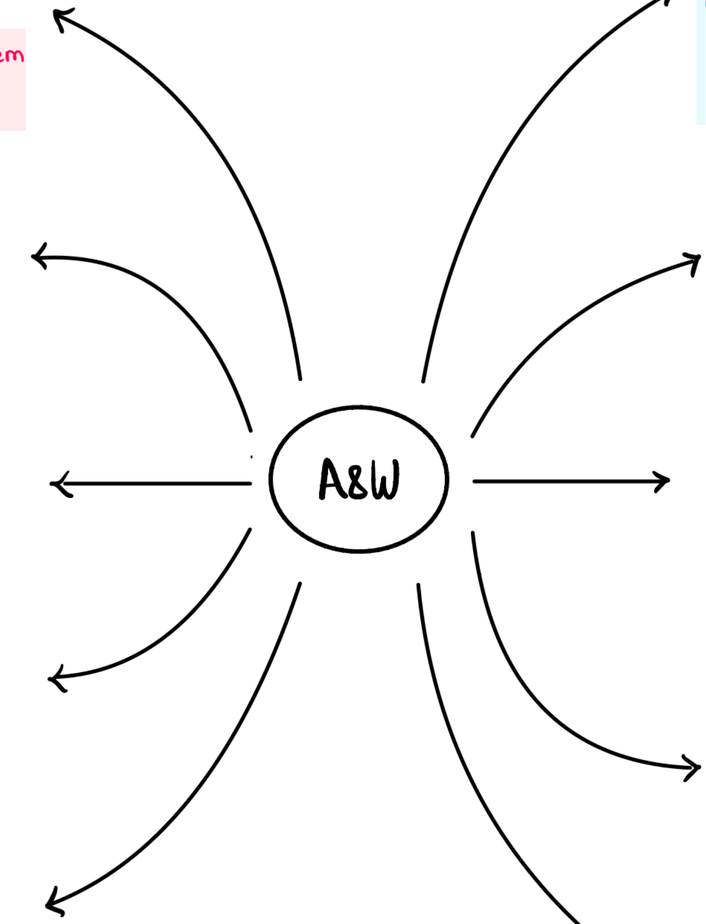
	Moodle	Written + Moodle	Programming
W1		Warm up exercise	
W2	Mini Quiz	Theory Exercise	Programming Exercise
W3		Peer Grading Exercise	Programming Exercise
W4	Mini Quiz	Theory Exercise	Programming Exercise
W5		Peer Grading Exercise	Programming Exercise
W6	Mini Quiz	Theory Exercise	Programming Exercise
W7		Peer Grading Exercise	Programming Exercise

Programming Part

- One Probability one Flow Exercise each year
- Old exams will be published



A&W Overview



Connectivity

- Articulation Points
- Bridges
- Block-Decomposition
- Menger's Theorem

Cycles

- Eulerian Cycle
- Hamiltonian Cycle
- TSP

Matchings

- Definition
- Algorithms
- Hall's Theorem

Colorings

- Definition
- Algorithm
- Brooks's Theorem

Wahrscheinlichkeit

- Grundbegriffe und Notationen
- Bedingte Wahrscheinlichkeiten
- Unabhängigkeiten
- Zufallsvariablen
- Wichtige Diskrete Verteilungen
- Abschätzen von Wahrscheinlichkeiten

Randomized Algorithms

- Las-Vegas
- Monte-Carlo
- Longest Path Problem
- Primality Test
- Target-Shooting
- Finding Duplicates

Flow

- Definition
- Maxflow-Mincut
- Ford-Fulkerson
- Matching w. Flow
- Edge-disjoint paths w. Flow

Minimum Cut

- Definition
- Cut(G) Algorithm
- Bootstrapping

Graph Algorithms

Convex Hull

- Definition
- Jarvis Wrap
- Local optimization

Smallest Enclosing Circle

- Definition
- First Algorithm
- Final Algorithm

Geometric Algorithms

Lernphase

Tipps for A&W

- As I promised, you’re very well prepared already

- However, you need to practice !
  - Minitests
  - Theory tasks
  - CodeEx

  - Kahoots

How to study for A&W

in the Lernphase

Use the exam prep page !!

- Recap topics use the summary/skript , Add/remove things , prepare your own summary !
- Theory exercises solve the relevant exercises not the weird ones
- Mock exam tasks document with mock exam tasks we've solved in class , try it yourself !
- Kahoots a folder with all of the kahoots will be uploaded. I'll add remaining topics.
- You can always ask me :)

- Watch the youtube videos when I upload them
- Work on Probability tasks, Work on Flow tasks
- Do exam trials , Code regularly !

Exam Preparation Page Introduction

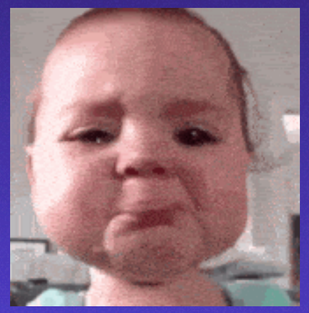
Let’s take a break

Mock Exam

Last Weeks ...

- 08.05 : Randomized Algorithms II
- 15.05 : Flow
- 23.05 online : Minimum Cut , Smallest Enclosing Circle
- 28.05 extra session : Exam Prep Session ✅ + Pizza and Drinks
- 30.05 last extra session : Convex Hull (shortly remaining primality tests)

Bye...



Nil Ozer