

DM865 (10 ECTS)

Heuristikker og Approximationsalgoritmer

[Heuristics and Approximation Algorithms]

[dm865.github.io](https://dm865.github.io)

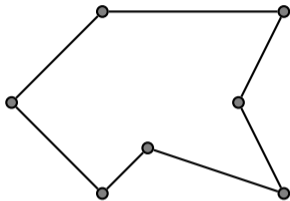
Spring semester

Lene Monrad Favrholt • Marco Chiarandini

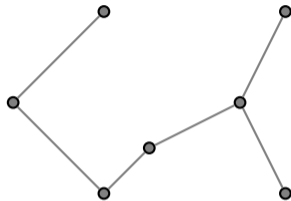
lektorer, IMADA

# Approximation Algorithms

A 2-approximation algorithm for TSP



$c(TSP)$



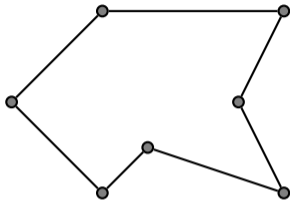
$c(MST)$

$$c(MST) \leq c(TSP)$$

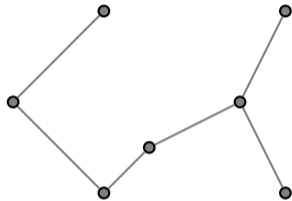
$$c(H) \leq 2 \cdot c(MST) \leq 2 \cdot c(TSP)$$

# Approximation Algorithms

A  $3/2$ -approximation algorithm for TSP



$c(TSP)$

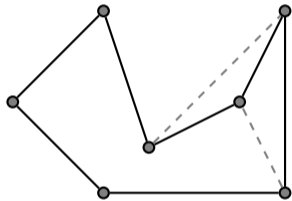
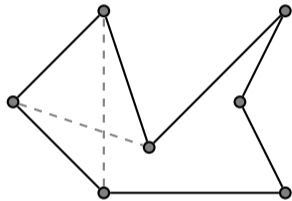
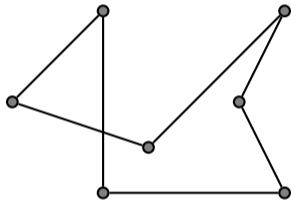


$c(MST)$

$$c(MST) \leq c(TSP)$$

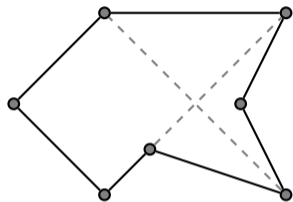
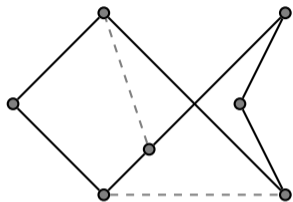
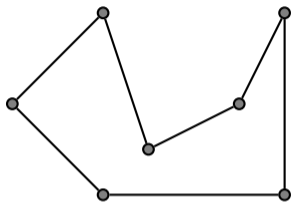
$$c(H) \leq c(MST) + c(M) \leq c(TSP) + \frac{1}{2}c(TSP) = \frac{3}{2} \cdot c(TSP)$$

## Local Search

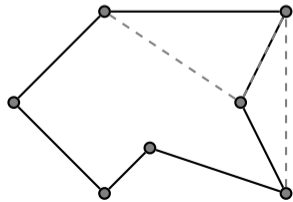
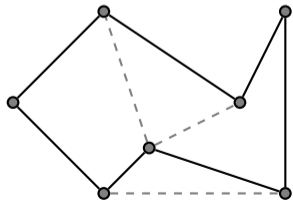
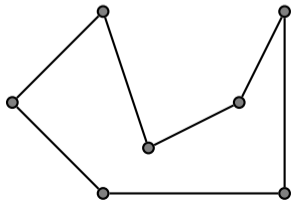


# Metaheuristics

Accepting worsening changes



Trying different changes



# Contents

	Approx Algorithms	Local Search + Metaheuristics
Set Cover		
Satisfiability		
Traveling Salesman		
Scheduling		
Knapsack		
Bin packing		

# Course Formalities

- Prerequisites:
- ✓ Programming (DM502, DM503, DM550)
  - ✓ Algorithms and Datastructures (DM507)
  - ✓ Complexity and Computability (DM508, DM553)
  - ✓ Linear and Integer Programming (DM559, DM545, DM554)

Credits: 10 ECTS

Language: English or Danish

Classes: intro:  $2h \times 24$ ; training:  $2h \times 24$

Material: slides + text book + articles + starting code

# Assessment (10 ECTS)

- Two practical project assignments passed/failed with internal censor by the teacher (include programming in Python)
- Oral exam based on:
  - the theoretical part
  - two practical assignments

Grading by the danish 7-mark scale with external examiner. Exam aids allowed.



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