1. Fundaments

a) geodata is digital data whith some sort of geo information

b) 1. Road Network connection
   2. Position of Restaurants
   3. Boundarys of an country
   4. Elevation data

c) 1. Normaly movies are not considat as geodata. But when they have information like where the movie was shot in coordinates or just as topogical information like a country its comsidat to be geodata

   2. Satellite images of Mars are special. The picture are some sort of georeferenced but geodata stands also for geodata from the earth. Thats why the images are not considat to be geodata.

   3. Thats of course geodata, when the travel routs are given as some sort of geomtric or topoligical information

d) I - Input and Update
   M - Managment and modeling
   A - Analysis and simulation
   P - Presentation and Output

g) Vector representation:
   → Data that is based on point information (coordinates) which also can buid Poylios and Polygons.
   1. Position data of restaurantes
   2. Shape of countrys

Raster data:

→ Decompose an area into equal sized cells.

1. Elevation data

2. humidity data

2. Modelling

a) Modelling this is the process in which is tried to represent a real life phenomen which some given data or observaton. In perspective to a geographical information system we want to transfer the data into this system which possible less inaccracy.

b) thematic modelling: Cluster objects that discribe the same phenomen together. Those than build the object of the class we want to define.

gemetric modelling: Modelling with some sort of geo reference system

topologiacal modelling: Modelling of the attrihtes and there connection to each other.

c) Discrte Modelling:

- Here objecs are modelld which have a fix boundary in which there are difine. An observation is classified with these objecs. This also make them countable.

Continious field:

- Here we have a space of continious valus without boundary. Any measurment just represent the value at exacly the observed location.

e) I whould ~~model~~ model all three objects in the vector representation. Here we would lose some information like the size of a city, but the data still is correct in respect to each other.
  - Therfore the citys ~~who~~ would be ~~polygon~~ Point, which discribe there position (Mean position).
  - River would be polylios which is a good way to represent a river
  - And the countries are represant as polygons

Vector data is here by ● less coast efficient to store and taste to calculat whith

→ We could also store tho citys as polygons, when we want to keep there size.

f)
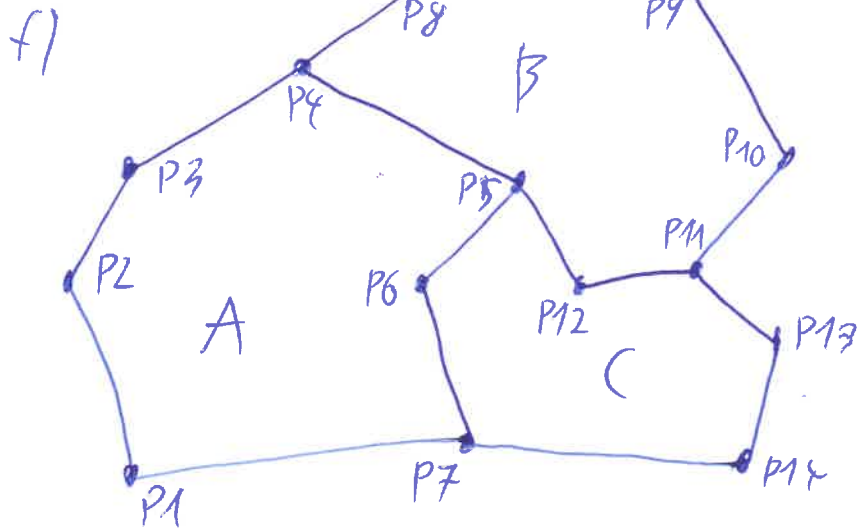
  - We can with a simple box boundry model based on ~~vertex~~ vertexes

$A = (P1, P2, P3, P4, P5, P6, P7, P1)$

$B = (P4, P8, P9, P10, P11, P12, P5, P4)$

$C = (P7, P6, P5, P12, P11, P13, P14, P7)$

g) - When citys and countrys are rater daten its easy. We can check for all cells that contain a city which countryes they contain. Then we can say it belongs to the majority

- When both are nur vector data we have to test if the point of a city is insiede the polygon of ur country.

→ Therefore we check fist all minimal bounding boxes which can contain the city for all countryes.
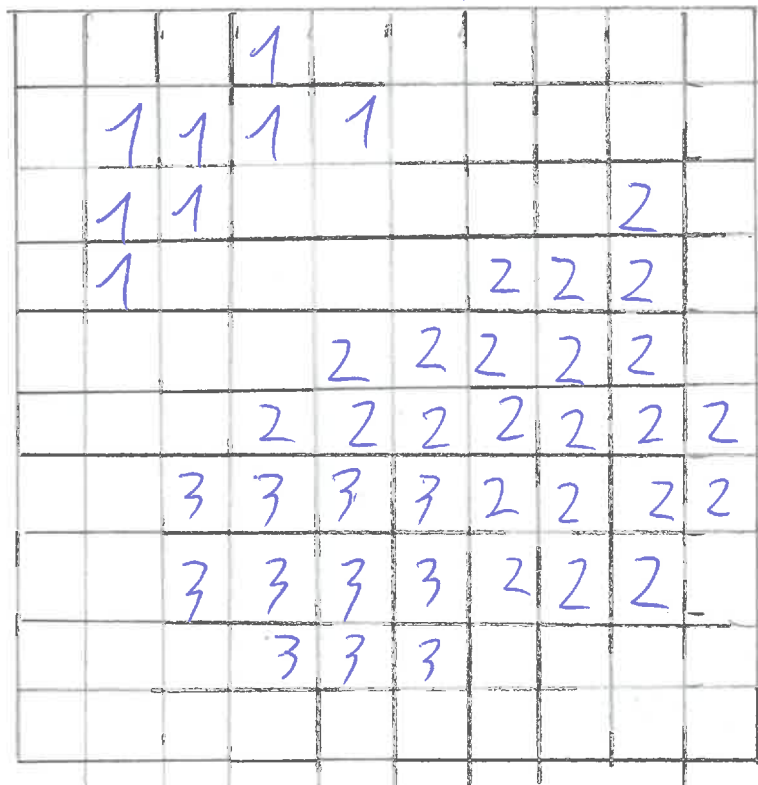
→ When this is true, a ray is created thats start from the city and travel horizontal to the right.

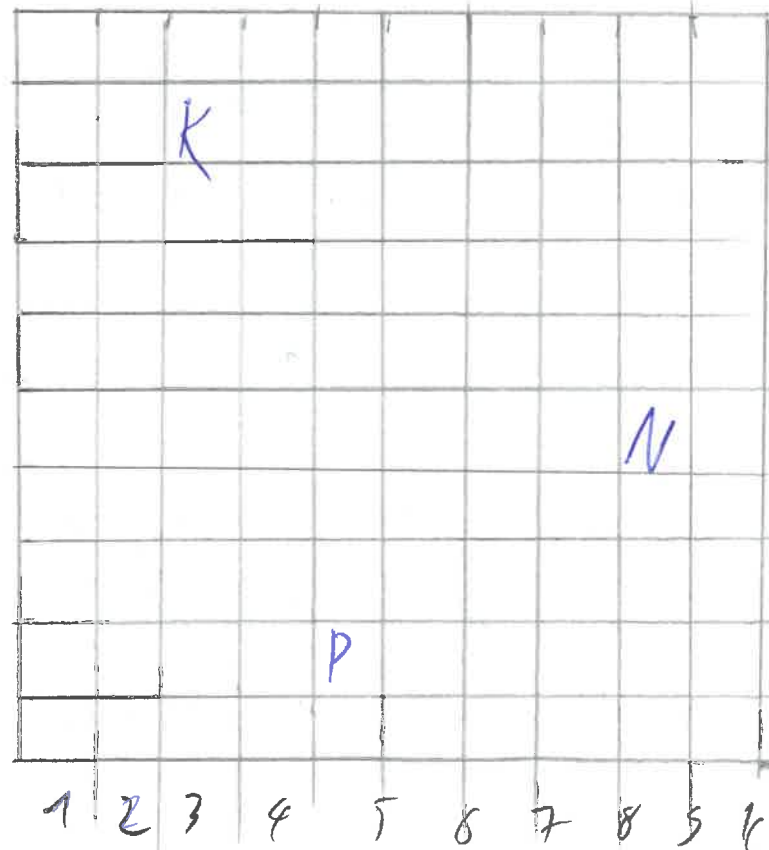→ Then we count how often it crossed an edge of a polygon

→ When the number is ~~ein~~ odd the point is inside a polygon.

3. Raster representation

Islands

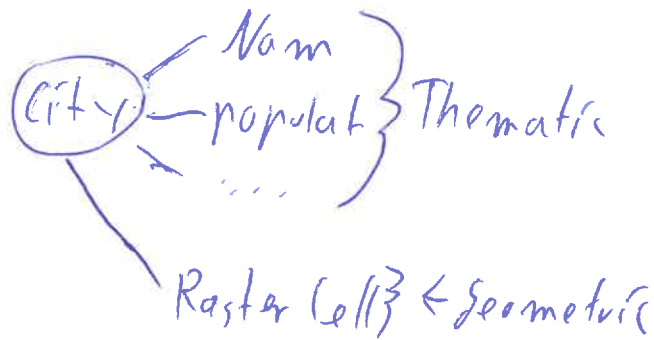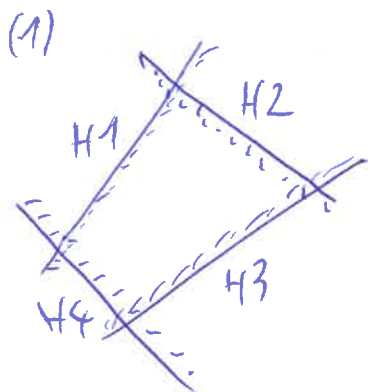Cities

b) The problem is that the raster cells only show som sort of the mean of data.

They why the size of the islands is not exact and it can look like if two islands have a land boundary, because there wasn't enoght space to represent the water gap. This can be fixied with smaler sized raster cells.
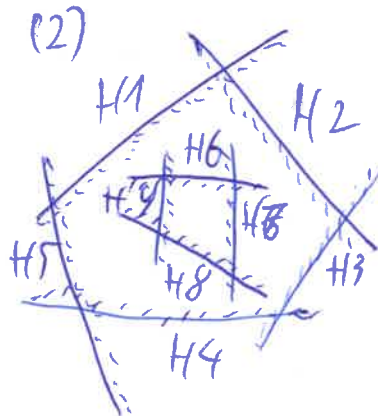
c) We can define the wanted thematic/information as thematic atrrbutes and the raster cell as the gemetric information. In this case we can just give all raster cell all wanted no attributes. Cells that don't lay in a city are emty and cells that contain a city have information for these atributes.

4. Halft-space modelling

(1)

(1) = H1 ∧ H2 ∧ H3 ∧ H4

(2)

(2) = (H1 ∧ H2 ∧ H3 ∧ H4 ∧ H5) /
(H6 ∧ H7 ∧ H8 ∧ H9)

H1 H2
H3
H4
H5 H6

$(H1 \wedge H2 \wedge H3) \cup$
$(H5 \wedge H3^c \wedge H4 \wedge H2^c) \cup$
$(H4^c \wedge H5^c \wedge H6)$

b)

As seen there

b)

5. Binary Search Tree

a)

c)

d)

e) Element 13 can't be removed because its not the minimal value and therefore not the root of the heap.
Element 13 must be a root vertex to get removed

6. Sorting

a) Bubblesort works by comparing every element of an array which with his right neighbor. Is the left side greater both values get swapped.
Because the array has to be traversed n times and we have to compare each time n elements the time complexity is n^2.

b)   Prut 13
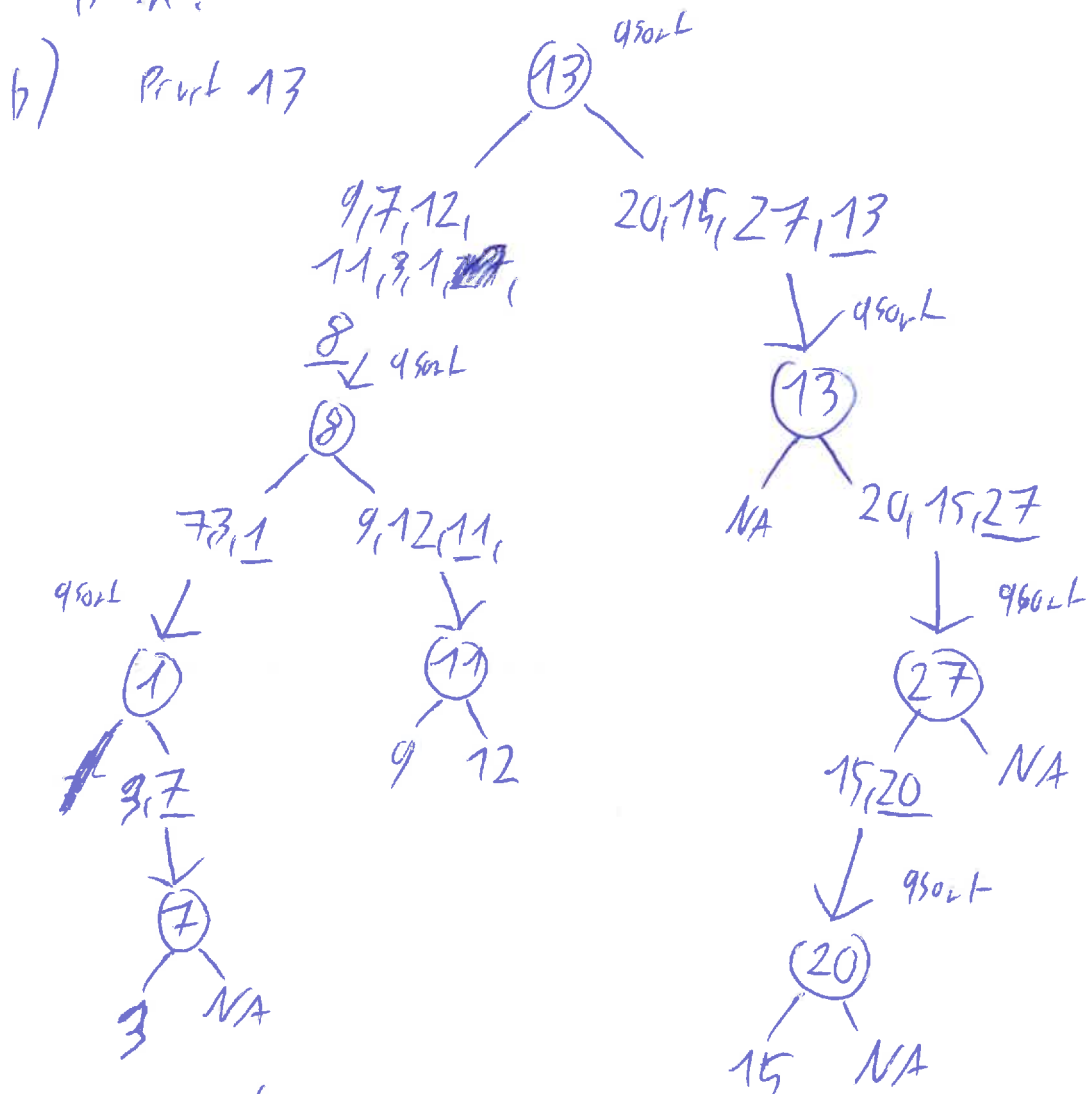
— An in-situ implimentation is in implimentation where all calculation can be made in one array of the size of the data.

w/ /7

7. Boundin Envelops

- Minimum bounding box: Its simple to difine because its its just based on two points. But its just the really rough shape of an object where the shape can't be seen.

- Minimum bounding cile: More complicated to calculate. Its has the advantage that it don't move for rotating objecs

- Minimum convex Hull: Can't rotate so good like the cicle. But it a bettor estimation of the shape as the minimal bounding box. Take modium time from these three to be computatot.

b) - The gift wrapping algorithm is a method to croate a convex hull.

→ Its starts by crating an ancor like by the point wirsh the lowest Y value that is horizontal.

→ From this point it calcults all possible connection-lines and ther angle to the ancor line.

→ The point with the lowost angle is choosen as the next support point

→ An endline is croate between the two points. This new edge function as the now ancor line.

→ This task gets ropeated until the starting point is reached again.

W2 /8
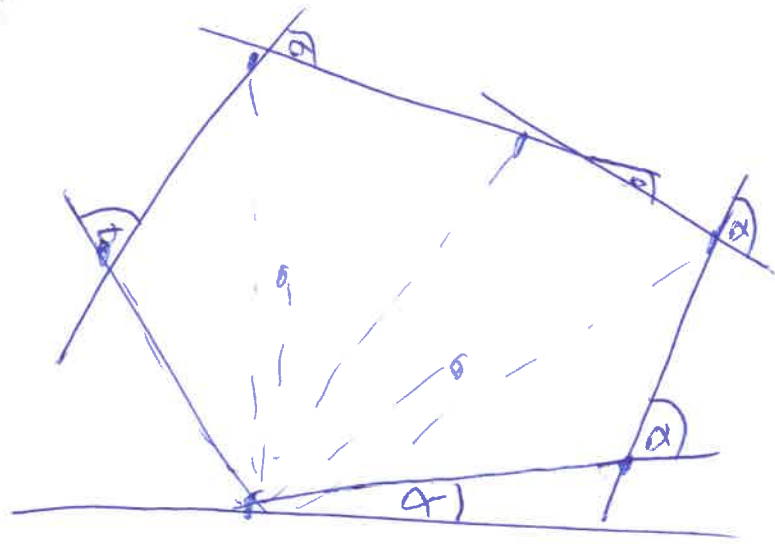
Concusion:

- First try of the exam
- One prior other exam done
- Time was more managebl. Also seemed more easy
- 15:30min faster finished than needed!