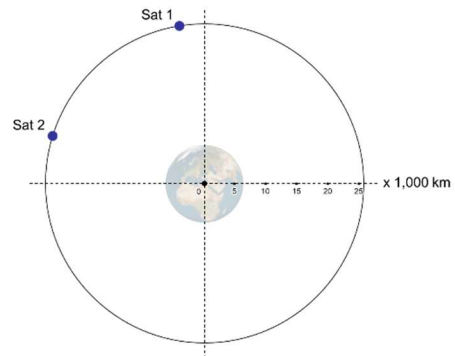# Location-aware mobile application development

Exercise 1/6, 26.10.2018

1. Assuming we live in **2D** (Earth here is a disc), and that:

   - sat 1 emits from location (4, 25) with $\Delta t$ = 70 ms
   - sat 2 emits from location (24, 7) with $\Delta t$ = 80 ms
   - the speed of light is $c \approx$ 300,000 km/s
   - the GPS receiver is somewhere on the planet

   Answer the following questions:

   a) Are two satellites enough to locate the user?
   b) If so, what is the location of the receiver?

2. Find out the coordinates of Joensuu and Kuopio. Assuming Earth radius is R = 6371 km, calculate the distance between the two cities using:
   a) Manhattan distance
   b) Euclidean distance
   c) Haversine distance
   d) By finding directions using Google Maps or OSRM
   How do the results vary and why? Can each of the distances be useful in some situation?

3. Select two LBS apps and answer the following questions:
   a) What do they do?
   b) Who are the target users?
   c) How useful you think they are?
   d) Could they be improved in some way?

4. In Mopsi, go to Radu's route collection and try to find the route shown on the right by using any available means. Record the time it took to find it. Answer these questions:
   a) What is the distance?
   b) What is the speed?
   c) What is the duration?
   d) What is the transportation mode?

5. Download the route and send it to the Polygonal approximation method from here:
   http://cs.uef.fi/mopsi/routes/reductionApi
   How many points are enough to display the route with no significant loss of information?

6. Fill in the self-evaluation form here:
   https://docs.google.com/spreadsheets/d/1wXb5eV2ARtfNiG8c7ECQ8VYmYK87iG7dU4y-Z31EgfI/edit?usp=sharing
   On the top you can use your student number or some means of recognizing yourself later. You will be also asked to fill in this form at the end of the course.