

LO53 final test

Please provide two separate documents: one for GNSS part and one for mobile networks part.

1. GNSS (10 points)

Knowledge questions (2 points)

- Q1. Why is the time introduced as a variable when solving GPS receiver location?
Q2. In a GNSS, how is evaluated the distance between a satellite and a receiver?
Q3. What is the multiplexing method used in GLONASS to share the frequency used by the satellites?
Q4. Give 2 differences between Galileo and GPS.

Exercise 1 (5 points)

From the following data, find coordinates of point M:

A (0,0,0)	B (100,100,0)	C (0,100,100)	D (50,50,100)
AM = 96.95	BM = 139.28	CM = 86.02	DM = 37.42

Exercise 2 (3 points)

Write and explain the *non linear least squares* algorithm used by GPS receivers to compute their location.

2. Mobile networks (10 points)

Refer to second document.

LO53 Final Exam

Indoor and outdoor positioning using mobile phone data

Name :

1. Theoretically (5 points)

ALL ANSWERS MUST BE JUSTIFIED TO GET ALL THE POINTS

Question 1.a: Name at least 3 positioning systems with their drawbacks and advantages.

Answer 1.a:

Question 1.b: What spatio-temporal scales can be used over a telecommunication network?

Answer 1.b:

Question 1.c: Represent the signaling events data collection over telecommunication network architecture. (Precise the network technology)

Answer 1.c:

Question 1.d: Explain how “car speed” can be produced over a given road?
Hint: What kinds of event are targeted and why is that? Are we dealing with aggregated or desegregated car speed?

Answer 1.d:

Question 1.e: i) What particularity of the underground network architecture is exploited to produce Quality of Service indicator?

ii) Which dataset (AFC or signaling events) would contain:

- the most distinct users
- most rows

Answer 1.e:

2. Real life (5 points + 2 bonus points)

Question 2.a: Propose another data source that could be merged with the one used in exercise to fulfill your study. Explain your choice.

Answer 2.a:

Question 2.b: According to you, which is the main advantage of using a signaling events dataset? Explain.

Answer 2.b:

Question 2.c: Let your exercise summary attached to the answer paper you are giving back (5 points)