

## Linear Algebra and Geometry exam handbook, a.y. 2024-2025

### Section 1: the exam and its rules

The exam consists of **2 tests**, taken in different moments and in different classrooms.

- **Test 1** is a computer based test, lasting 45 minutes, taken in front of a computer in a lab (LAIB). It consists of 8 closed-answer questions (quizzes) concerning numerical methods discussed during the lectures; to answer most of the questions it is necessary to use MATLAB.

Test 1 allows you to obtain up to 10 points; in what follows we will denote such score  $G_1$ . Each wrong answer has a penalty of 15% of the question's value; there is no penalty for not answering questions.

**To pass Test 1 and be admitted to Test 2, you need to obtain a score greater than or equal to 4.25 points:  $G_1 \geq 4.25$ .**

- **Test 2** is a written test, lasting 60 minutes, taken on a piece of paper in a classroom. It consists of 8 closed-answer questions (quizzes) and 1 exercise with open-answer questions concerning the theoretical and practical aspects of linear algebra and geometry.

Test 2 allows you to score up to 23 points. In detail, each correct answer to a quiz gives you 2 points, for a total of up to 16 points, while the exercise is worth up to 7 points, so  $16+7=23$ . There is no penalty for wrong answers. In what follows we will denote the quiz score by  $G_2$  and the exercise score by  $G_3$ .

**To pass Test 2, you need to obtain a score greater than or equal to 7 points for the quizzes and greater than or equal to 2 points for the exercise:  $G_2 \geq 7$  AND  $G_3 \geq 2$ .**

The final grade  $G$  is the sum of the score obtained in Test 1 plus the scores obtained in Test 2, so:  **$G=G_1+G_2+G_3$** . Please note that one can get up to  $10+16+7=33$  points, and this makes things easier for you.

**To pass the exam, you need to obtain a score greater than or equal to 18 points:  $G \geq 18$ .** The "lode" (honors) is awarded if you achieve a score of 33.

During the tests, the use of books, notes, electronic devices other than the laboratory PC, and other unauthorized material is prohibited.

Students with Specific Learning Disorders will of course be given all necessary compensatory measures.

## Section 2: midterms

As explained above, your final score  $G=G1+G2+G3$  will be made up of:

1.  $G1$  = score obtained in the computer based Test 1, up to 10 points
2.  $G2$  = score obtained in the written Test 2, quizzes part, up to 16 points
3.  $G3$  = score obtained in the written Test 2, exercise part, up to 7 points.

If you have taken the midterms and obtained any positive score in them, these are to be considered “bonus points” that you can spend in your exam in the following way.

If you got  $X1$  points in midterm #1 and  $X2$  points in midterm #2, your final midterm score is  $X=X1+X2$ . When you take the final exam, this is what will happen:

1.  $G1$  = minimum  $\{10, \text{actual score you get in Test 1} + X/3\}$
2.  $G2$  = minimum  $\{16, \text{actual score you get in the quizzes in Test 2} + 2X/3\}$
3.  $G3$  = actual score you get in the exercise in Test 2.

Please be aware that the midterms allow you to score up to 2.25 points each, for a total of up to 4.5 points, and that these bonus points are valid until the September exam only!

Any negative score obtained in a midterm will be considered null.

## Section 3: some concrete examples

- 1) Carlos Santana took both midterms, and he obtained a score of  $X1=1.39$  in the first one and  $X2=1.50$  in the second one. His total midterm score is  $X=2.89$ .

He enrolls in the first July exam and in Test 1 in LAIB he obtains 3.55. His  $G1$  score is then  $G1 = \text{minimum } \{10, 3.55 + X/3\} = \text{minimum } \{10, 4.51\} = 4.51$ .

Carlos obtains a  $G1$  score greater than 4.25 (only thanks to the midterm score!) and is therefore admitted to take Test 2. When he does, he gives the correct answer to 4 quizzes out of 8, and is able to get 5 points in the exercise. His  $G2$  score is then

$G2 = \text{minimum } \{16, 8 + 2X/3\} = \text{minimum } \{16, 9.9\} = 9.9$ ,  
and his  $G3$  score is simply  $G3 = 5$ .

His final score in the exam is  $G=G1+G2+G3=19.41$ , and his final grade is 19.  
Congrats Carlos Santana, you pass the exam!

- 2) Jack Sparrow also took both midterms, but he didn't study the first time and obtained a negative score of -0.34, so for him  $X1=0$ . In the second midterm he instead obtained  $X2=1.5$ . His total midterm score is  $X=1.5$ .

He enrolls in the second July exam, and in Test 1 in LAIB he obtains a score of 3.55. His  $G1$  score is then  $G1 = \text{minimum } \{10, 3.55 + X/3\} = \text{minimum } \{10, 4.05\} = 4.05$ .

This means that even with the help of the midterms' points Jack does not pass the minimum requirement for being admitted to the second part of the exam.

What a bummer Jack Sparrow, you fail the exam. The silver lining is that you can re-use your midterm score next time you try the exam, until September!

- 3) Marylin Monroe took both midterms and she did pretty well in both: she obtained a score of  $X_1=2.25$  in the first one and  $X_2=1.39$  in the second one. Her total midterm score is  $X=3.64$ .

She enrolls in the September exam and in Test 1 in LAIB she does really well, getting a 8.85. Her G1 score is then  $G_1 = \text{minimum} \{10, 8.85 + X/3\} = \text{minimum} \{10, 10.06\} = 10$ . (she did really well but you cannot get more than 10).

She is therefore admitted to take Test 2, and when she does, she answers 6 quizzes correctly out of 8, and obtains 5.5 points in the exercise. Her G2 score is then  $G_2 = \text{minimum} \{16, 12 + 2X/3\} = \text{minimum} \{16, 14.4\} = 14.4$ , and her G3 score is simply  $G_3 = 5.5$ .

Her final score in the exam is  $G=G_1+G_2+G_3=29.9$ , and her final grade is 30. Congrats Marylin Monroe, you pass the exam with flying colors!

- 4) Lady Gaga only took the first midterm, where she scored 0.64. So for her  $X_1=0.64$  and  $X_2=0$ . Her total midterm score is  $X=0.64$ .

She enrolls in the first July exam and in Test 1 in LAIB she obtains 6.85. Her G1 score is then  $G_1 = \text{minimum} \{10, 6.85 + X/3\} = \text{minimum} \{10, 7.06\} = 7.06$ .

She is therefore admitted to take Test 2, and when she does, she answers only 3 quizzes correctly out of 8, and obtains 3.5 points in the exercise. Her G2 score is then  $G_2 = \text{minimum} \{16, 6 + 2X/3\} = \text{minimum} \{16, 6.43\} = 6.43$ , and her G3 score is simply  $G_3 = 3.5$ .

This means that even with the help of the midterm score Lady Gaga does not pass the minimum requirement for Test 2.

Lady Gaga, unfortunately you did not pass. Remember you can re-use your midterm score until September!