MATH2059 NUMERICAL METHODS

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Mid-Term Exam

Due Date:

20.04.2021-17:00

Important Warnings:

1) The submission must be in **pdf format**, and **hand-written on an A4 size paper.**
2) The submission must have **name, surname, student ID number**, and **signature** on the top left corner of the document on each page submitted.
3) File name of your pdf file must be in the format: Name_Surname_studentID
4) The submission must be uploaded as **a single pdf file.** over UES system.
5) Any answer that contains notations, formulas that are NOT used in the lecture or the recitation will NOT be taken into account.
6) Make sure that the document you will upload is in the correct order, solving problems on separate pages would help!
7) You will have **only 2 attemps** to submit your work.
8) Due date is 20.04.2021 at 17:00 . Any attempt to send your homework after the due date by any means will not be accepted

9) You must show your work, give explanations and write clear solutions

10) Alternative solutions (more than one method) will cause the cancellation of the question and it will not be graded

11) The exam is intended for about 120 minutes. Please take into consideration that any technical problem in uploading your work will cause your exam to be void and in such a situation you will have to apply for the make-up exam. Hence to avoid such an unwanted case please try to finish your exam in 120 minutes and use the rest of your time to scan and upload your homework Anyway in case you choose to do so, you may for sure use the whole time of 3 hours allocated for your take-home exam.

(1) 25 pts

Find the decimal equivalents of the next largest and next smallest floating-point machine number to

$$0 \quad 01111111111 \quad 0101001100000000000000000000000000000000000000000000.$$

(2) 25 pts

Let $f(x) = 3(x+1)\left(x - \frac{1}{2}\right)(x-1)$. Use the Bisection method on the interval $[-2, 1.5]$ to find p_3.

(3) 25 pts

Use a fixed-point iteration method to determine an approximation to $\sqrt{3}$ that is accurate to within 10^{-4}.

(4) 25 pts

Let $f(x) = x^2 - 6$ and $p_0 = 1$. Use Newton's method to find p_2.