Review for the Second Midterm Exam

1. Second Midterm Exam
   - on Wednesday 24 July from 2:00pm till 3:40pm
   - skipping policy

2. Calculus, Plotting, and Solving
   - functions, differentiation, integration, series
   - plotting and solving

MCS 320 Lecture 35
Introduction to Symbolic Computation
Jan Verschelde, 24 July 2023

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on Wednesday 24 July from 2:00pm till 3:40pm

- You must sign up to the exam before noon on Tuesday 23 July by sending an email that you commit to taking the exam.

- Without signing up, you will not receive the questions.

- You must solve the questions on the exam *individually*.

- The exam will have multiple versions of the questions.

- The answers must be uploaded into gradescope
  - in one single Jupyter notebook,
  - before 3:40pm on Wednesday 24 July 2024.

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Skipping Policy

- You skip the exam automatically if you do not do anything.

- If you skip a midterm exam, then the 100 points are transferred to the final exam, which will count for 100 points more.

- If you have seen the questions, but do not submit your answers, then you will receive 0/100.

- If you have taken the exam, then your score counts.

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Functions, Differentiation, Integration, Series

Lectures 19 to 25 (3.5 sessions) cover the third part.

- Know the difference between SageMath and Python functions.

- Memoization makes recursion efficient.

- We defined functions to compute expressions.

- The slope of the tangent line at a point on a curve is computed via implicit differentiation or via a linear Taylor series approximation.

- If a symbolic antiderivative does not exist, then we can numerically evaluate a definite integral, except for singularities in the interval.

- A symbolic-numeric factorization works over complex intervals.

- Lagrange multipliers solve constrained optimization problems.

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Plotting and Solving

Lectures 26 to 32 (3.5 sessions) cover the fourth part.

- In two dimensions, we have four different types of plots: explicit, implicit, parametric, and polar plots.

- In three dimensions, we distinguish between surfaces and curves.

- An animation is a list of plots, called frames.

- We solve polynomial equations by triangular forms.

- In linear algebra, we compute matrix factorizations.

- Differential equations occur in mathematical modeling.

- We ended with polyhedral and unconstrained optimization.