Math 31B: Week 1 Section

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Information

The main course webpage is CCLE:
https://ccle.ucla.edu/course/view/18W-MATH31B-4
You should read the syllabus posted if you have not already. Some important highlights are:

- Math questions and administrative questions that apply to more than one person should be asked on the CCLE discussion board.
- Homework is due during Friday lectures. Late homework must be emailed to Alex Austin within 24hrs and this incurs a 50% penalty.

This week I will be holding office hours on Thursday at 3pm in MS 3957. Please go to
https://goo.gl/forms/gKfpmXcUsPlJFIav1
to vote on what office hours suit you, as well as a few other questions about things we could do in future sections.
On my web page, you can find electronic versions of any worksheet from sections as well as solutions.
http://www.math.ucla.edu/~ben.szczesny/
If you forget the link, you could probably also find it by googling something like "ben szczesny ucla". At the moment it's not linked by the main course webpage.

Discussion Questions

Question 1. Find the derivative of the following functions:

(a) $f(x) = e^{x^2+2x-3}$,

(b) $f(t) = \dfrac{1}{1-e^{-3t}}$,

(c) $f(\theta) = \sin(e^{\theta})$,

(d) $f(x) = \dfrac{e^x}{3x+1}$.

Question 2. Find the critical points of the function $f(x) = \dfrac{e^x}{x}$ for $x > 0$ and determine whether they are local minima or maxima (or neither).

Question 3. For $y = e^x + e^{-x}$, find critical points and points of inflection. Then sketch the graph.

Question 4. Compute the linearisation of $f(x) = 2e^{-2x}\sin(x)$ at $a = 0$. Use a linear approximation to estimate $f(0.2) - f(0)$.

Question 5. Evaluate the following integrals:

(a) $\displaystyle\int e^x + e^{-x}dx$,

(b) $\displaystyle\int e^x \cos(e^x)dx$.

Homework Questions

Questions 14, 18, 26, 30, 34, 36, 40, 44, 50, 56, 62, 64, 72, 78, 88, 90, 92 of section 7.1 of the class textbook.

Extra Questions

Question 6. Find the Area bounded by $y = e^2, y = e^x$, and $x = 0$.

*** Question 7.** Prove that $f(x) = e^x$ is not a polynomial function. Hint: Differentiation lowers the degree of a polynomial by 1.

*** Question 8.** Define a function $A(x) := \int_1^x \frac{1}{t} dt$ for $x > 0$. Prove that $A(e^x) = x$. Hint: differentiate $A(e^x)$.