Mathematics A1a Homework

Academic year 2016 autumn

Due to November 10

You have to solve at least 3 out of 6!

Example 1.
$$\lim_{x \to \infty} e^{-x} \left(3x^3 - 2x^2 + 1\right) = ?$$

Example 2. Prove that for every $x < y$

$$\left| \frac{\sin(y) - \sin(x)}{y - x} \right| \leq 1$$

Use the mean value theorem!

Example 3. Where is the maximum value of the following function?

$$f(x) = x(1 - x) \quad \text{where } x \in [0, 1]$$

Example 4. What are the domain and range of the following functions?

$$f(x) = \log(x^2 - 1)$$

and

$$g(x) = \log(x^2 + 1)$$

Example 5.
$$\lim_{x \to 0} \frac{\tan(x) - \sin(x)}{\sin(3x)} = ?$$

Example 6.
$$\lim_{x \to 2} \frac{x^2 - 4}{x + 2} = ?$$