

Midterm Exam Calculus 1

2 october 2007, 9.00-11.00.

The use of annotations, books and calculators is not permitted in this examination.

1. (2 points) Prove that for every integer $n \geq 5$, we have $n^2 < 2^n$.
2. (2 points) Find all (positive and negative) integers n such that $(1+i)^n + (1-i)^n = 0$.
3. (1 point) Give the precise definition of $\lim_{x \rightarrow \infty} f(x) = -\infty$.
4. (2 points) Evaluate $\lim_{x \rightarrow 0} \tanh(x) \ln(x)$.
5. (2 points) Determine the minimum value of the function $g(x) = x^x$ for all $0 < x < \infty$.