MA211 Calculus I – Assignment 1

September 19, 2016, Lecturer: Claas Röver

Hand in your solution at the beginning of the lecture on **Monday, 26 Sep 2016**.

QUESTION 1. For each of the following functions, verify that it is one-to-one and find the inverse function.

(a) $f(x) = \ln(x+1), \quad x > -1$

(b) $g(x) = 2x^2 - 8x, \quad x \geq 2$

(c) $h(x) = \dfrac{1}{x-1}, \quad x > 1$

QUESTION 2. Find the derivatives of the following functions with respect to x.

(a) $f(x) = \tan^{-1}(x/a)$

(b) $g(x) = x\cosh^{-1}(x), \quad x \geq 1$

(c) $h(x) = \sin^{-1}(x^2/4), \quad -2 \leq x \leq 2$

QUESTION 3. Verify that $\tanh^{-1}(x) = \dfrac{1}{2}\ln\left(\dfrac{1+x}{1-x}\right)$.

QUESTION 4. If $\tanh(x) = 12/13$, find $\sinh(x)$ and $\cosh(x)$ without a calculator and showing your workings.

QUESTION 5. Verify the following identities. *Hint:* Start with the right-hand sides.

(a) $\sinh(x+y) = \sinh(x)\cosh(y) + \cosh(x)\sinh(y)$

(b) $\cosh(x+y) = \cosh(x)\cosh(y) + \sinh(x)\sinh(y)$