

20.04.2006

## 1. Exercise sheet Analysis II for MCS Summer Term 2006

**(G1.1)** Show that the following functions are differentiable and determine their derivatives:

- (i)  $f_1 : ]0, \infty[ \rightarrow \mathbb{R}, f_1(x) := x^{\frac{1}{x}},$       (ii)  $f_2 : \mathbb{R} \rightarrow \mathbb{R}, f_2(x) := \cos x \sin^2 x$   
(iii)  $f_3 : \mathbb{R} \setminus \{0\} \rightarrow \mathbb{R}, f_3(x) := x e^{\frac{1}{x}},$       (iv)  $f_4 : ]0, \infty[ \rightarrow \mathbb{R}, f_4(x) := \sqrt{x} + \frac{1}{\sqrt{x^3}}$   
(v)  $f_5 : \mathbb{R} \rightarrow \mathbb{R}, f_5(x) := \ln(\exp(x)).$

**(G1.2)** Use Taylor's Theorem to estimate  $\sqrt{26}$  with an error smaller than  $10^{-4}$ .