October 14, 2004 Lecturer Dmitri Zaitsev Michaelmas Term 2004

Course 2E1 2004-05 (SF Engineers & MSISS & MEMS)

S h e e t 1

Due: in the exercise sessions on Wednesday/Thursday, 20th/21th of October 2004

Exercise 1

Find the domain and range of the following functions and draw their graphs:

(i) $f(x) = -x^2$,
(ii) $f(t) = 1 + t^3$,
(iii) $f(x) = 1/\sqrt{1 - x^2}$,
(iv) $f(x) = 2^{-x} + 1$,
(v) $f(t) = \ln(t + 1)$,
(vi) $f(t) = \mathsf{sin}(2\pi t) + 2$.

Exercise 2

Find the limits:

$$\text{(i)} \lim_{x \to -1} (x^2 - 3^x), \quad \text{(ii)} \lim_{x \to 1} \frac{x^2 + x - 2}{x - 1}, \quad \text{(iii)} \lim_{x \to 0^-} e^{\frac{1}{x}}.$$

Exercise 3

Calculate derivatives of functions in Exercise 1.