B-14-1 Calculus
Fall 1997
Prof. H. Riecke

Problem Set 2 September 26, 1994
Due October 3, before class.

1. Graphs

Ch.1.3: **10, 14, 24, 40**, 5, 11, 15, 29, 35, 55.

E1: Consider the parabola $y = x^2 - \frac{2}{3}x + \frac{1}{3}$.
a) Use your calculator to find its minimum approximately (give the result to 4 significant figures).
b) Determine its minimum by completing the square.
Compare the effort and the achieved precision.
Note: for more complicated functions we will use calculus (derivatives).

Read Chapter 1.4 before you do the following problems:
Ch.1.4: 13, 16, 22, 23, 24, 13

2. Limits

Ch.2.2: **30, 36**, 1, 11, 21, 35, 39, 43, 45, 51.
In each problem state which law(s) of limits you are using!

Ch.2.3: 29, 39.
E2: Use a calculator or matlab or maple to investigate the following limits:

$$\lim_{x \to 0} \sin(\frac{1}{x^2}),$$

$$\lim_{x \to 0} \sin(\frac{1}{x^2 + 0.0001}),$$

$$\lim_{x \to 0} e^{\frac{1}{x}},$$

$$\lim_{x \to 0} \frac{\sin x^2}{x^2 + x^3}.$$

To do so calculate the functions at sufficiently many x-values (approaching $x = 0$) and graph them. Use the graphs as guidance to decide whether the limits exist and if so, what their value is. You may need to distinguish between two-sided and one-sided limits.

Extra-credit problem: Ch.2.3 28.

Note: Hand in **all bold-faced** problems (including **E1** and **E2**).