MATH 5620 NUMERICAL ANALYSIS II
HOMEWORK 1, DUE JANUARY 27 2009

Problem 1 B&F 5.1.4 a,b

Problem 2 (K&C 8.2.2) Verify that the function $y(t) = t^2/4$ solves the initial value problem:

$$\begin{cases} y' = \sqrt{y} \\ y(0) = 0. \end{cases}$$

Apply Euler's method and explain why the numerical solution differs from the solution $t^2/4$. (no proof necessary)

Problem 3 In the following problems you need to compare several numerical methods for initial value problems on two problems. Compare the results to the actual values (the true solutions are given in B&F 5.2.3)

B&F 5.2.1 a,c (Euler's method)
B&F 5.3.1 a,c (Taylor's method of order 2)
B&F 5.4.1 a,c (Modified Euler's method)
B&F 5.4.5 a,c (Heun's method)
B&F 5.4.13 a,c (Runge-Kutta method of order four)

Problem 4 B&F 5.5.3 a,b