DEN Homework # 3

Solve the problems and then bring your work to the lab in the fourth week of school.

1. Consider the function $f(x) = x^4$. Approximate its derivative at the point $a = 1$ using the forward difference with step $h = 0.01$.
You surely know the right value of this derivative. Find the absolute and relative error of your approximation.

2. Approximate the value of the integral $\int_0^2 \sqrt{x}\, dx$ using:
a) the method of left rectangles with $n = 4$;
b) the method of right rectangles with $n = 4$;
c) the trapezoid method with $n = 4$.
You do not have to conclude the calculations to get just a number, answers like $\frac{1}{7}[2^2 + 3^2]$ are enough (in fact we prefer them because then we can see what you did).

Remark: As a preparation for exams you can try, for all three methods, sketch a picture that would explain what you are calculating, that is, how the methods actually work. Then you can see whether you are able to look at the pictures and derive general formulas for the three methods. What is their order? And what does this order mean?