

**Third computer lab. First part of three.**

1. Given the function  $f(x) = \sin(x^2) + \cos(x)$  compute using rigorous automatic differentiation the range of  $f$  and  $f'$ .
2. Integrate the ODE

$$\begin{cases} \dot{x} &= y \\ \dot{y} &= x^2 + \sin(x) \end{cases}$$

using nonrigorous automatic differentiation (a.k.a. Taylor's method). Plot the phase portrait.