

Third set of Problems. First part of three.

1. Consider the function $f(x) = \sin(x^2) + e^x \cos(x)$. Compute $f(0)$, $f'(0)$ and $f''(0)$ using automatic differentiation.
2. Explain how to (non-rigorously) integrate the ODE

$$u' = u^2 + \cos(u)$$

using automatic differentiation. The integrator must be flexible with respect to the order of the method.