

Written HW21 – MATH 3504 Spring 2021

**Due by 23 April for timely completion credit**

In this homework, we will use the Euler method to approximate the solution of the initial value problem

$$\begin{cases} x' = x^2 e^{\sin(x)} \\ x(0) = 1 \end{cases}$$

Recall that Euler's method says that to approximate  $x' = f(t, x)$ , we use the recurrence relation

$$x(t+h) = x(t) + hf(t, x(t)).$$

So you begin by plugging in  $t = 0$  and using the initial condition on the right-hand side (the left side becomes  $x(h)$ ). Then you plug in  $t = h$  (so the left side becomes  $x(2h)$ ), and so on.

1. Using  $h = 0.5$ , approximate  $x(0.5)$  and  $x(1)$ .
2. Using  $h = 0.25$ , approximate  $x(0.25)$  and  $x(0.5)$ .
3. Using  $h = 0.1$ , approximate  $x(0.1)$  and  $x(0.2)$ .