Quiz 4 (17-11-2018)

MATH 371, INTRODUCTION TO NUMERICAL COMPUTING

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Question 1. [**2 marks**] Given

$$3\frac{dy}{dt} + 5y^2 = \sin t, \quad y(0.3) = 5,$$

and using a step size of $h = 0.3$, the value of $y(0.9)$ using Euler's method is most nearly
(a) -35.318. (b) -36.458. (c) -658.91. (d) -669.05.

Question 2. [**2 marks**] Consider the following initial-value problem

$$t\,y'(t) = y/t, \quad y(1) = 1,$$

defined on $\mathbb{D} = \{(t, y)|1 \leq t \leq 2, \sqrt{t} \leq y \leq 2\}$. Is the initial-value problem well-posed? Why?

Question 3. [**1 mark**] Suppose you are using the Runge-Kutta method of order four to numerically approximate the solution of an initial-value problem over the time interval $[0, 1]$. By what factor would you expect the local truncation error to decrease when you increase the number of time steps taken from 100 to 400.