

Math 10A HW11 Solutions

(1) True! When drawing slope field there is no dependency on y -coordinate.

(2) False!

(3) True! Autonomous differential equation \Rightarrow no dependency on t when drawing slope field

(4) False! See worksheet on Euler's method.

(5)

(a) $\frac{dy}{dt} = \sin(t) \Rightarrow$ Graph D
(no dependency on y)

(b) $\frac{dy}{dt} = t \sin(y)$

(c) $\frac{dy}{dt} = \sin(y) \Rightarrow$ Graph C
(no dependency on t)

(d) $\frac{dy}{dt} = y \sin(t)$

(6) (a) $\frac{dy}{dt} = y(1-y)(1+y) \Rightarrow$ graph e
(no dependency on t)

(b) $\frac{dy}{dt} = \sin(t) \Rightarrow$ graph f
(no dependency on y)

(c) $\frac{dy}{dt} = \sin(t+y) \Rightarrow$ graph g

(d) $\frac{dy}{dt} = \frac{t}{10} + y \Rightarrow$ graph h

$$(y' = F(x, y))$$

$$(7) \quad y' = \frac{y^2 + 2ty}{3 + t^2} \quad h = 0.5$$

$$y(0) = 0.5$$

$$y_1 = y_0 + h F(x_0, y_0) = 0.5 + 0.5 F(0, 0.5)$$

$$y_2 = y_1 + h F(x_1, y_1) = y_1 + 0.5 F(0.5, y_1)$$

$$y_3 = y_2 + h F(x_2, y_2) = y_2 + 0.5 F(1, y_2)$$

$$y_4 = y_3 + h F(x_3, y_3) = y_3 + 0.5 F(1.5, y_3)$$

$$\text{So } y(2) \approx y_4.$$

(8) Same procedure as above except

$$F(x, y) = 2t + e^{-ty}, \quad x_0 = 0, \quad y_0 = 1.$$

Will similarly find $y(2) \approx y_4$.

(9)