Arts & Science 1D06 Quiz #9 SOLUTIONS 26 February 2016

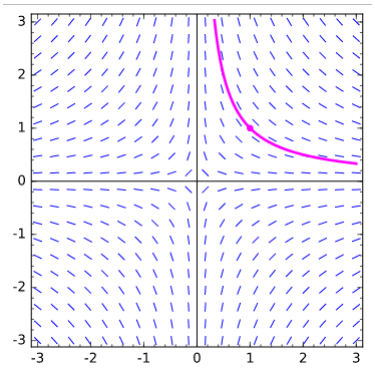
Full Name:_____ Student # :_____

TA:_____

Please provide detailed solutions to the problems below. Correct responses without justification may not receive full credit. The use of a calculator is permitted.

[10 marks]

(1) Consider the slope field pictured below



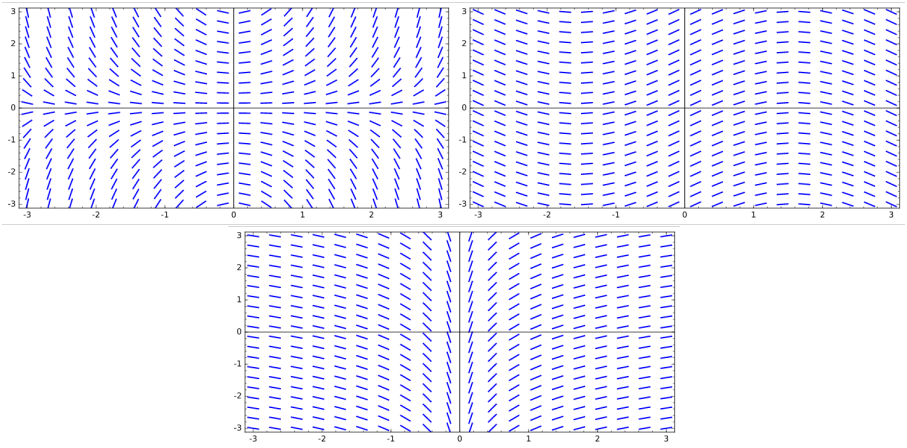
(a) *[4]* Which of these differential equations describes this slope field, and why?

$(i)\ \dfrac{dy}{dx} = xy$ $(ii)\ \dfrac{dy}{dx} = \cos(x)$ $(iii)\ \dfrac{dy}{dx} = \dfrac{1}{x}$ $(iv)\ \dfrac{dy}{dx} = -\dfrac{y}{x}$.

There are ample reasons, but one is that option (iv) is the only one which has a negative slope at the point $(x, y) = (1, 1)$. Also, this is the only option where the slope is zero when $y = 0$ and undefined when $x = 0$.

(b) *[3]* On the slope field, sketch the solution that satisfies $y(1) = 1$.

(c) *[3]* Pick one of the other differential equations from part (a) and draw a rough sketch its slope field on the axes below.



Top-Left: $y' = xy$. Top-right: $y' = \cos(x)$. Bottom $= y' = 1/x$