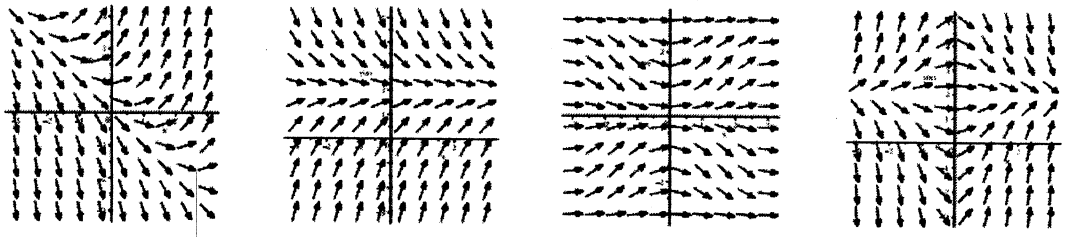
Math 1272 Quiz 4 Name: Solutions
Time allowed: 20 minutes

1. (*30 points*) Match the given differential equation with its direction field (labeled I-IV). Give reasons for your answers.



(I) (II) (III) (IV)

(a) $y' = \sin x \sin y$

III

when $x=0$, $y'=0$
when $y=0$, $y'=0$

(b) $y' = x(2-y)$

IV

when $y=2$, $y'=0$
when $x=0$ $y'=0$

(c) $y' = x+y-1$

I

when $y=-x$, $y'=0$

(d) $y' = 2-y$

II

y' doesn't depend on x

2. (*20 points*) Give the equation for the n^{th} y-value of Euler's Method of the initial value problem $y' = F(x,y)$. Explain the significance of each term.

$y_n = y_{n-1} + h\,F(x_{n-1}, y_{n-1})$

y_n: new y-value
y_{n-1}: last y-value
h: Step Size
$F(x_{n-1}, y_{n-1})$: Slope @ previous point

PLEASE SEE THE OTHER SIDE FOR MORE PROBLEMS.

3. (*35 points*) Solve the differential equation

$$\frac{dy}{dx} + e^{x+y} = 0$$

$$\frac{dy}{e^y} = -e^x\,dx$$

$$\int e^{-y}\,dy = -\int e^x\,dx$$

$$-e^{-y} = -e^x + C$$

$$\ln(-y) = \ln(+e^x - C)$$

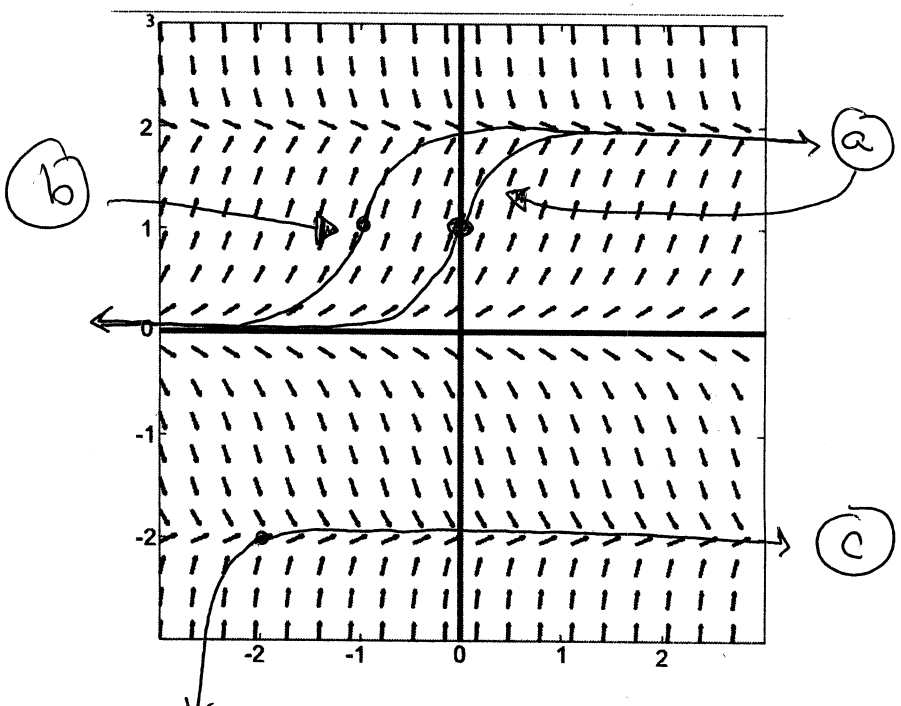
$$y = -\ln(+e^{-x} - C)$$

4. (*15 points*) Below is a direction field for $y' = y(4 - y^2)$. Sketch the graphs of the solutions that satisfy the given initial conditions (*please label your graphs*):

   (a) $y(0) = 1$

   (b) $y(-1) = 1$

   (c) $y(-2) = -2$



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