IB Math HL1 Name: key

Period: _____

Exit Slip

For Problems 1-3 , consider the differential equation

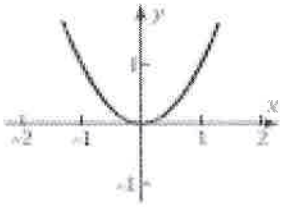
$$\frac{dy}{dx} = x(y-1)^2$$

1. On these axes, sketch a slope field for the given differential equation at the 11 points indicated.

$\frac{dy}{dx}_{(-2,1)} = -2(1-1)^2 = 0$ $\quad \frac{dy}{dx}_{(-1,-1)} = -2$

$\frac{dy}{dx}_{(-2,0)} = (-2)$

2. Use the slope field for the given differential equation to explain why a solution could not have this graph.



The slope field indicates there is a Horizontal Asymptote $y=1$. The graph on right will Not have the asymptote.

3. Find the particular solution to the given differential equation with the initial condition y =-1 if x =0.

$$\int \frac{dy}{(y-1)^2} = \int x\,dx$$

$$\int (y-1)^{-2}\,dy = \int x\,dx$$

$$\frac{-1}{y-1} = \frac{1}{2}x^2 + C \quad \leftarrow \begin{pmatrix} x=0 \\ y=-1 \end{pmatrix}$$

$$C = \frac{-1}{-2} = \frac{1}{2}.$$

$$\frac{-1}{y-1} = \frac{1}{2}x^2 + \frac{1}{2}$$

$$\frac{1}{1-y} = \frac{x^2+1}{2}$$

$$1-y = \frac{2}{x^2+1}$$

$$-y = \frac{2}{x^2+1} - 1$$

$$y = 1 - \frac{2}{x^2+1}$$

$$= \frac{x^2+1-2}{x^2+1} = \frac{x^2-1}{x^2+1}$$

$\frac{a}{b} = \frac{c}{d}$

$\frac{b}{a} = \frac{d}{c}$