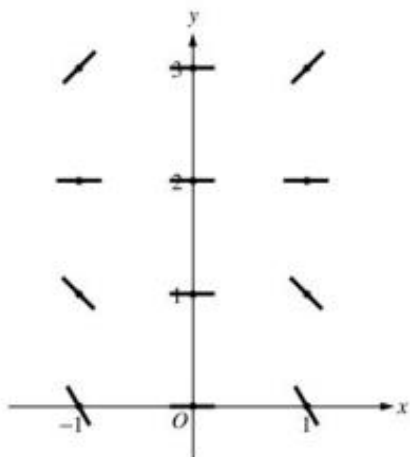


# DE FRQ HW Answers

## 2004B

(a)



(b) Slopes are negative at points  $(x, y)$  where  $x \neq 0$  and  $y < 2$ .

$$(c) \frac{1}{y-2} dy = x^4 dx$$

$$\ln|y-2| = \frac{1}{5}x^5 + C$$

$$|y-2| = e^C e^{\frac{1}{5}x^5}$$

$$y-2 = Ke^{\frac{1}{5}x^5}, K = \pm e^C$$

$$-2 = Ke^0 = K$$

$$y = 2 - 2e^{\frac{1}{5}x^5}$$

$\left\{ \begin{array}{l} 1 : \text{zero slope at each point } (x, y) \\ \text{where } x = 0 \text{ or } y = 2 \\ \\ 2 : \left\{ \begin{array}{l} \text{positive slope at each point } (x, y) \\ \text{where } x \neq 0 \text{ and } y > 2 \\ \\ 1 : \left\{ \begin{array}{l} \text{negative slope at each point } (x, y) \\ \text{where } x \neq 0 \text{ and } y < 2 \end{array} \right. \end{array} \right.$

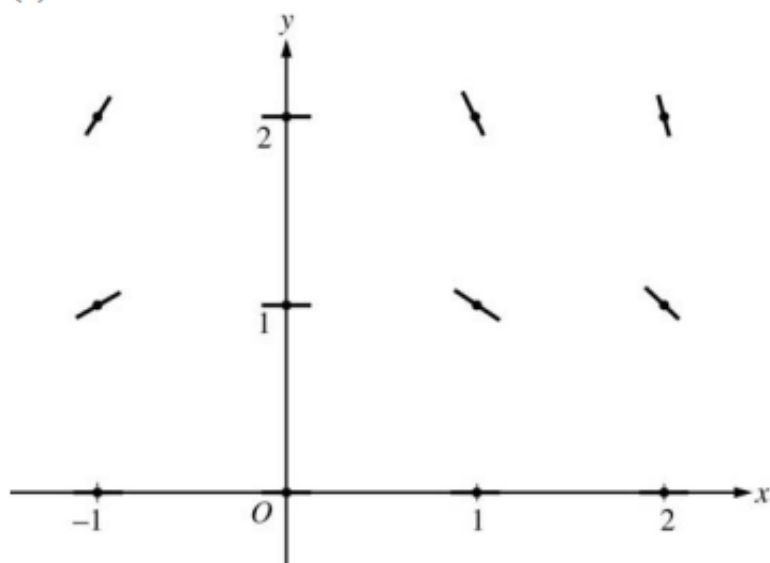
1 : description

$\left\{ \begin{array}{l} 1 : \text{separates variables} \\ 2 : \text{antiderivatives} \\ \\ 6 : \left\{ \begin{array}{l} 1 : \text{constant of integration} \\ 1 : \text{uses initial condition} \\ 1 : \text{solves for } y \\ \\ 0/1 \text{ if } y \text{ is not exponential} \end{array} \right.$

Note: max 3/6 [1-2-0-0-0] if no constant of integration

Note: 0/6 if no separation of variables

(a)



(b) Slope =  $\frac{-(-1)4}{2} = 2$   
 $y - 2 = 2(x + 1)$

(c)  $\frac{1}{y^2} dy = -\frac{x}{2} dx$   
 $-\frac{1}{y} = -\frac{x^2}{4} + C$   
 $-\frac{1}{2} = -\frac{1}{4} + C; C = -\frac{1}{4}$   
 $y = \frac{1}{\frac{x^2}{4} + \frac{1}{4}} = \frac{4}{x^2 + 1}$

$$2 : \begin{cases} 1 : \text{zero slopes} \\ 1 : \text{nonzero slopes} \end{cases}$$

1 : equation

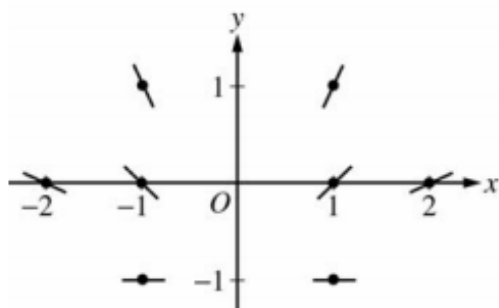
$$6 : \begin{cases} 1 : \text{separates variables} \\ 2 : \text{antiderivatives} \\ 1 : \text{constant of integration} \\ 1 : \text{uses initial condition} \\ 1 : \text{solves for } y \end{cases}$$

Note: max 3/6 [1-2-0-0-0] if no  
constant of integration

Note: 0/6 if no separation of variables

2006B

(a)



(b)  $\frac{1}{1+y} dy = \frac{1}{x} dx$

$$\ln|1+y| = \ln|x| + K$$

$$|1+y| = e^{\ln|x|+K}$$

$$1+y = C|x|$$

$$2 = C$$

$$1+y = 2|x|$$

$$y = 2|x| - 1 \text{ and } x < 0$$

or

$$y = -2x - 1 \text{ and } x < 0$$

2 : sign of slope at each point and relative steepness of slope lines in rows and columns

6 : { 1 : separates variables  
2 : antiderivatives  
1 : constant of integration  
1 : uses initial condition  
1 : solves for y

7 : { Note: max 3/6 [1-2-0-0-0] if no constant of integration  
Note: 0/6 if no separation of variables  
1 : domain