



**AP<sup>®</sup> Calculus AB  
2004 Sample Student Responses  
Form B**

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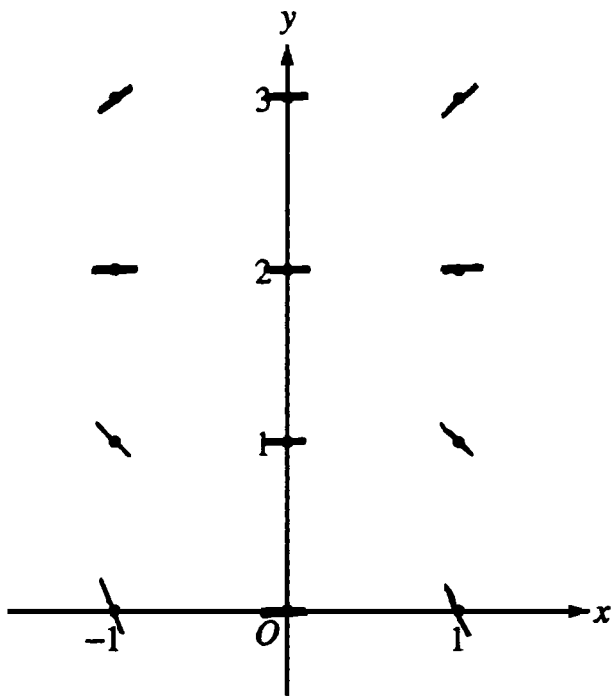
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NO CALCULATOR ALLOWED

Work for problem 5(a)



Work for problem 5(b)

$x^4$  is always positive  $\Rightarrow \frac{dy}{dx} < 0$  iff  $y < 2 \wedge x \neq 0$

$\therefore$  the negative slopes where  $y < 2$  and  $x \neq 0$ .

~~the negative slopes~~ become greater in magnitude as  $|x|$  become greater and  $|y-2|$  become greater

Continue problem 5 on page 13.

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A<sub>2</sub>

NO CALCULATOR ALLOWED

Work for problem 5(c)

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

$$\Rightarrow \ln |y-2| = \frac{x^5}{5} + C_1 \Rightarrow y-2 = e^{\frac{x^5}{5} + C_1} \Rightarrow y = C e^{\frac{x^5}{5}} + 2$$

$$f(0) = 0 \Rightarrow 0 = C e^0 + 2 \Rightarrow C = -2$$

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

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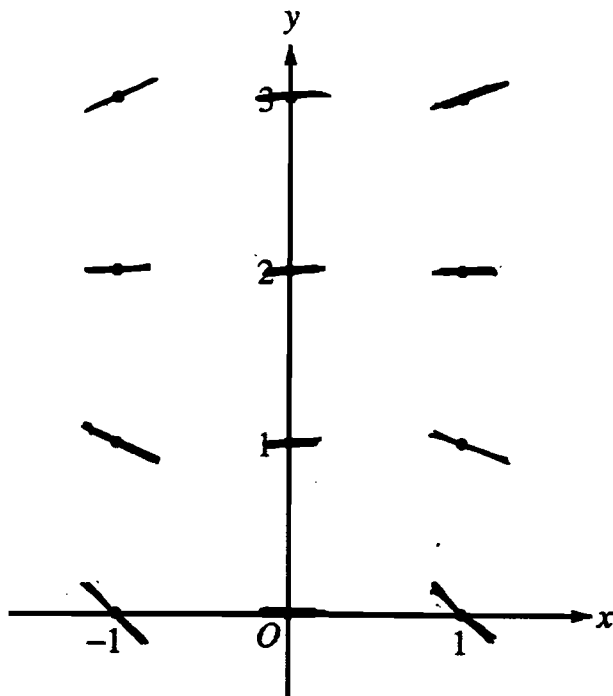
D1

NO CALCULATOR ALLOWED

Work for problem 5(a)

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

$(x,y)$	$\frac{dy}{dx}$
(0,0)	0
(0,1)	0
(0,2)	0
(0,3)	0
(1,0)	-2
(1,1)	-1
(1,2)	0
(1,3)	1



$(x,y)$	$\frac{dy}{dx}$
(-1,0)	-2
(-1,1)	-1
(-1,2)	0
(-1,3)	1

Work for problem 5(b)

There are four points <sup>for</sup> which the slopes are negative in Part (a)

They are (1,0) (1,1) (-1,0) and (-1,1)

If the slope  $(\frac{dy}{dx})$  is negative, that means the graph of  $y$  is decreasing at these four points

Continue problem 5 on page 13.

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D<sub>2</sub>

NO CALCULATOR ALLOWED

Work for problem 5(c)

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

$$x^4 dx = \frac{dy}{y-2}$$

$$\int x^4 dx = \int \frac{dy}{y-2}$$

$$\frac{x^5}{5} + C_1 = \ln|y-2| + C_2$$

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

$$y-2 = e^{\frac{x^5}{5} + C} = e^{\frac{x^5}{5}} \cdot e^C$$

$$= A e^{\frac{x^5}{5}}$$

$$f(x) = y = A e^{\frac{x^5}{5}} + 2 \quad f(0) = 0$$

$$f(0) = A e^{\frac{0^5}{5}} + 2 = 0$$

$$A e^0 + 2 = 0$$

$$A + 2 = 0$$

$$A = -2$$

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

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