



## AP<sup>®</sup> Calculus BC

### 2003 Sample Student Responses

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NO CALCULATOR ALLOWED

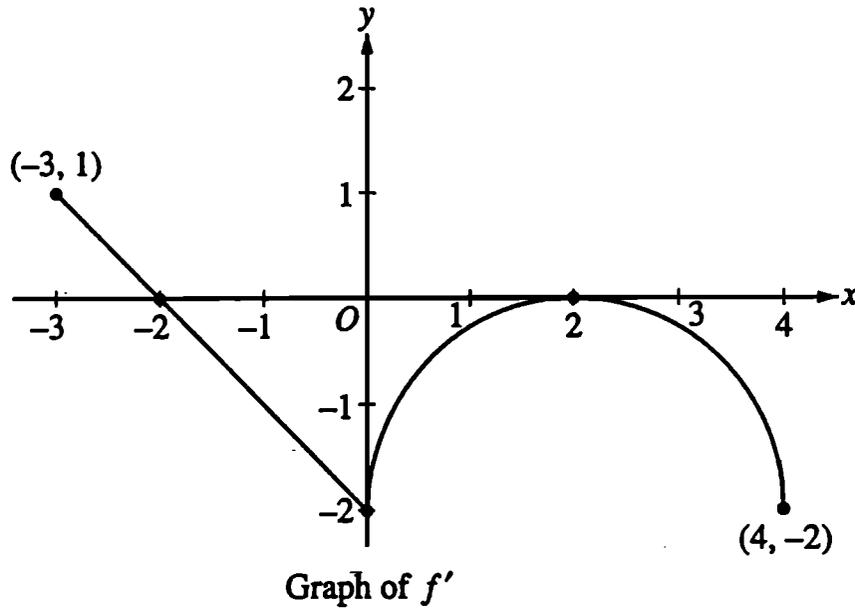
C<sub>1</sub>

CALCULUS AB  
SECTION II, Part B

Time—45 minutes

Number of problems—3

No calculator is allowed for these problems.



Work for problem 4(a)

$-3 < x < -2$  ;  $f'(x)$  is positive

Work for problem 4(b)

$x = 0, 2$  ;

$x$	$-3 < x < 0$	$0$	$0 < x < 2$	$2 < x < 4$
$f''(x)$	$-$	undefined	$+$	$-$

Continue problem 4 on page 11.

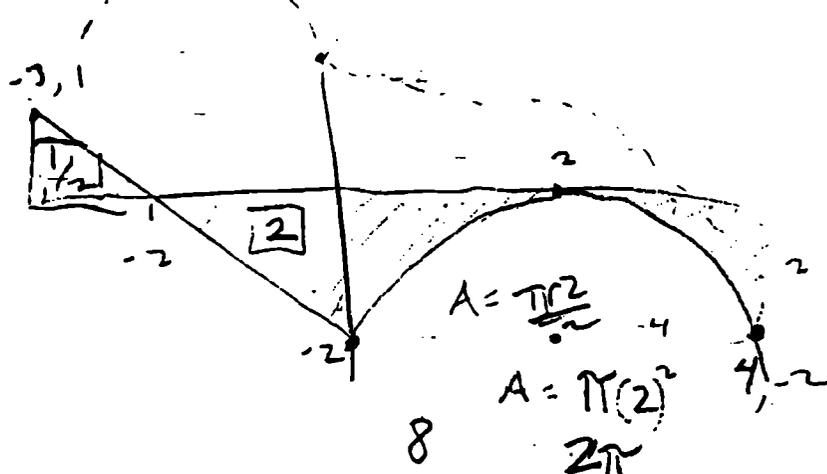
Work for problem 4(c)

point: (0, 3)

$$f'(0) = -2$$

$$y - 3 = -2(x - 0)$$

Work for problem 4(d)



$$f(-3) = \int_0^{-3} f'(x) dx + 3$$

$$2 - \frac{1}{2} + 3 = 4.5$$

$$f(4) = \int_0^4 f'(x) dx + 3$$

$$-(8 - 2\pi) + 3$$

$$-8 + 2\pi + 3$$

$$= 2\pi - 5$$

GO ON TO THE NEXT PAGE.

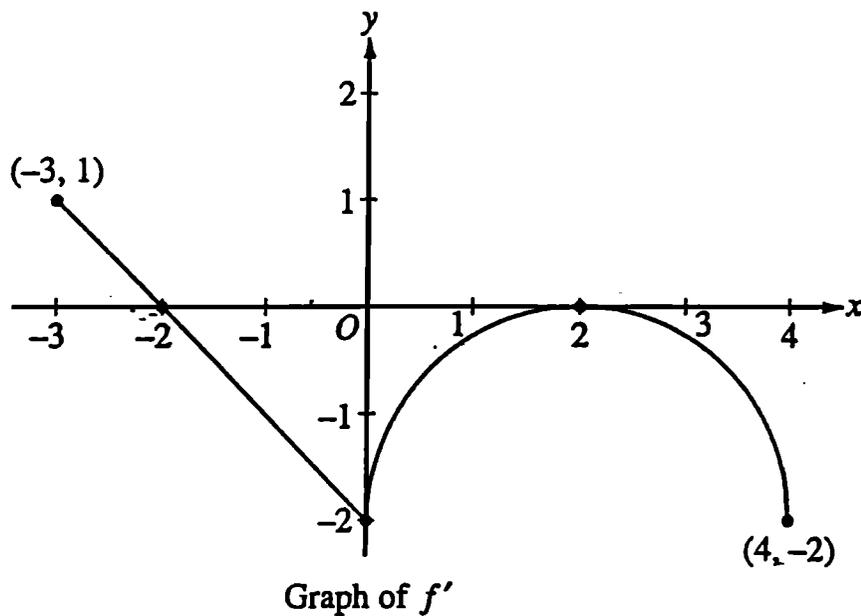
NO CALCULATOR ALLOWED

CALCULUS BC  
SECTION II, Part B

Time—45 minutes

Number of problems—3

No calculator is allowed for these problems.



Work for problem 4(a)

Increasing from  $x = -3$  to  $x = -2$   
because the derivative is positive

Work for problem 4(b)

$x = 0$  and  $x = 2$   
these are the local maxima and minima of  $f'(x)$

Continue problem 4 on page 11.

Work for problem 4(c)

at (0, 3) - slope is -2

$$y - 3 = -2(x - 0)$$

$$y = -2x + 3$$

Work for problem 4(d)

~~$f(3) = 1$~~

$$f(0) = 3$$

$$\int_0^{-3} f'(x) = -2 + .5 \text{ or } -1.5$$

3 - 1.5

$$\text{so } f(-3) = 1.5$$

$$\int_0^4 f'(x) = -\frac{1}{2}\pi(2)^2 = -2\pi$$

$$f(0) - 2\pi = f(4)$$

$$f(4) = 3 - 2\pi$$

GO ON TO THE NEXT PAGE.