



**AP[®] Calculus BC
2004 Sample Student Responses
Form B**

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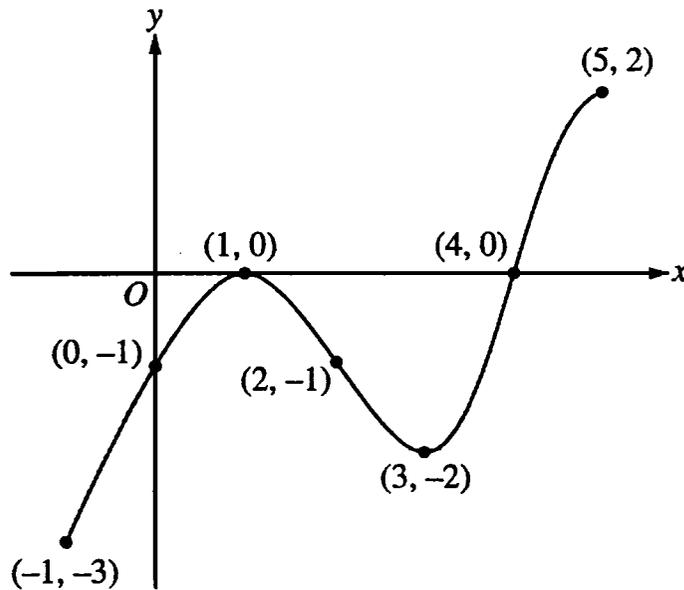
CALCULUS AB

SECTION II, Part B

Time—45 minutes

Number of problems—3

No calculator is allowed for these problems.

Graph of f'

Work for problem 4(a)

The two points of inflections of f are at $x=1$
and $x=3$.

reason: $f''(x) > 0$ for $x \in (-1, 1)$
 $f''(x) < 0$ for $x \in (1, 3)$
 $f''(x) > 0$ for $x \in (3, 5)$

Continue problem 4 on page 11.

NO CALCULATOR ALLOWED

Work for problem 4(b)

f has an absolute minimum at $x = 4$

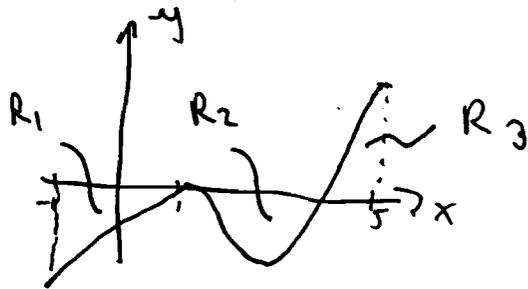
reason: $f'(4) = 0$ and:

x	-1	1	4	5
f'	-	-	0	+
f	↘	↘	↘	↗

↘ abs. min.

f has an absolute maximum at $x = -1$

reason:



$$R_1 + R_2 > R_3 \Rightarrow$$

$$f(-1) > f(5)$$

Work for problem 4(c)

$$g(x) = x f(x)$$

$$g'(x) = (x)' f(x) + x f'(x)$$

$$g'(2) = f(2) + 2f'(2)$$

$$= 6 + 2 \cdot (-1)$$

$$= 4$$

$$g(2) = 2 \cdot f(2)$$

$$= 12$$

$$(2, 12)$$

$$y = \frac{y-12}{x-2}$$

$$4x - 8 + 12 = y$$

$$y = 4x + 4$$

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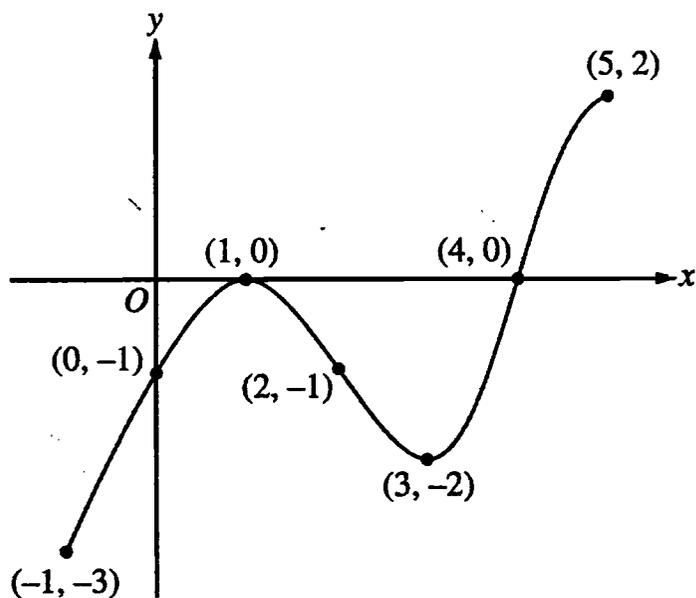
NO CALCULATOR ALLOWED

CALCULUS AB
SECTION II, Part B

Time—45 minutes

Number of problems—3

No calculator is allowed for these problems.

Graph of f'

Work for problem 4(a)

Inflection $\Rightarrow f''(x)$ changes sign, $f''(x)=0$
 \Rightarrow slope of $f'(x)$ changes sign f' slope = 0

at $x=1$ slope of $f'(x)$ from +ve to -ve \Rightarrow inflection
 at $x=3$ slope of $f'(x)$ from -ve to +ve \Rightarrow inflection

Continue problem 4 on page 11.

NO CALCULATOR ALLOWED

Work for problem 4(b)

minimum $\Rightarrow f'(x) = 0$ and $f'(x)$ changes from -ve to +ve

$f'(x) = 0 \Rightarrow x = 4$

x	-1	4	5
$f'(x)$	-	+	

\Rightarrow local minimum at $x = 4$
and absolute minimum

maximum $\Rightarrow f'(x)$ and $f'(x)$ changes from +ve to -ve
but there is no such pt \Rightarrow check endpoints

The decrease from $x = -1$ to $x = 4$ is more than increase from $x = 4$ to $x = 5$
 $\Rightarrow f(5) < f(-1) \Rightarrow$ abs. max at $x = 5$

Work for problem 4(c)

$g(x) = x f(x)$

$g'(x) = f(x) + x f'(x)$

$g'(2) = f(2) + 2f'(2) = 6 + 2(-1) = 4$

$\Rightarrow g(2) = 2f(2) = 2(6) = 12$

$\Rightarrow y - 12 = 4(x - 2)$

equation $y = 4x + 4$

GO ON TO THE NEXT PAGE.