



## AP<sup>®</sup> Calculus BC 2002 Sample Student Responses

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**NO CALCULATOR ALLOWED**

B<sub>1</sub>

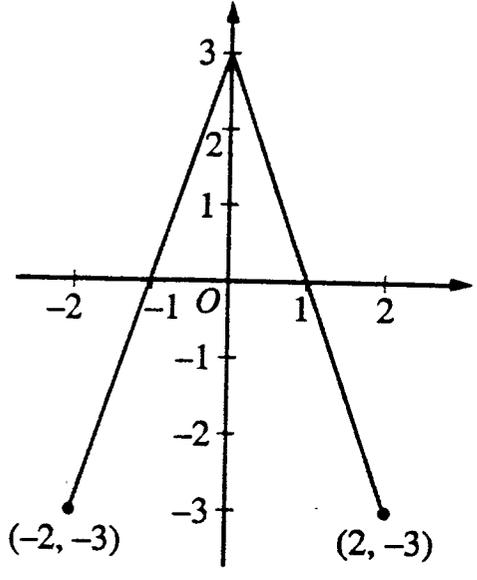
**CALCULUS BC**

**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)

$$g(-1) = \int_0^{-1} f(t) dt = -1 \cdot 3 \cdot \frac{1}{2} = -\frac{3}{2}$$

$$g'(-1) = f(-1) = 0$$

$$g''(-1) = f'(-1) = 3$$

4

4

4

4

4

4

4

4

4

4

NO CALCULATOR ALLOWED

B<sub>3</sub>

Work for problem 4(b)

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

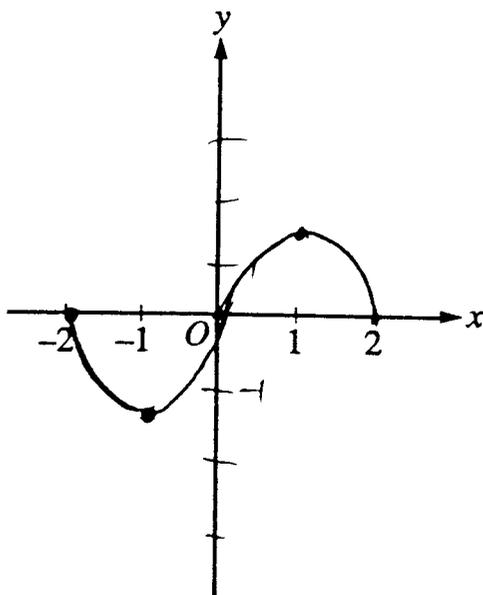
For  $-1 < x < 1$ ,  $g$  is increasing, because  $g'(x) = f(x)$  is positive for this interval.

Work for problem 4(c)

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

For  $0 < x < 2$ ,  $g$  concaves down, because  $g''(x) = f'(x)$  is negative for this interval.

Work for problem 4(d)



4

4

4

4

4

NO CALCULATOR ALLOWED

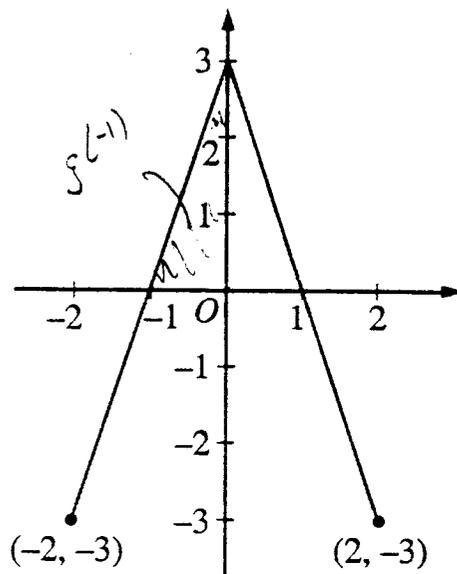
C<sub>1</sub>

CALCULUS BC  
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)

$$g(x) = \int_0^x f(t) dt$$

$$g(-1) = \int_0^{-1} f(t) dt = \frac{1}{2}bh = \frac{1}{2}(1)(3) = \frac{3}{2}$$

$$g(-1) = \frac{3}{2}$$

$$g'(-1) = f(-1) = 0$$

$$g'(-1) = 0$$

$$g''(-1) = \text{slope from } -2 \text{ to } 0 = \frac{-3-3}{-2-0} = \frac{-6}{-2} = 3$$

$$g''(-1) = 3$$

4

4

4

4

4

4

4

NO CALCULATOR ALLOWED

C2

Work for problem 4(b)

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

$g(x)$  increases when  $f(x)$  is positive  $f(x) > 0$  at  $-1 < x < 1$

$g(x)$  increases at  $-1 < x < 1$

Work for problem 4(c)

$g(x)$  is concave down where  $g''(x)$  is negative

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

$g''(x) = f'(x)$   $g''(x) = f'(x)$  is negative for all  $0 < x < 2$

$g(x)$  is concave down for all  $0 < x < 2$

$$f'(x) = \frac{-3-3}{2-0} = -3$$

Work for problem 4(d)

