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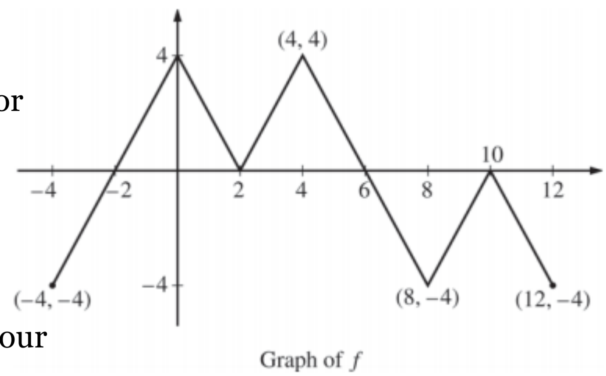
2016 SCORING GUIDELINES
Question 3

The figure above shows the graph of the piecewise-linear function f. For $-4 \leq x \leq 12$, the function g is defined by $g(x) = \int_2^x f(\mathrm{t})\, dt$.



(a) Does g have a relative minimum, a relative maximum, or neither at x = 10 ? Justify your answer.

(b) Does the graph of g have a point of inflection at x = 4 ? Justify your answer.

(c) Fund the absolute minimum value and the absolute maximum value of g on the interval $-4 \leq x \leq 12$. Justify your answers.

(d) For $-4 \leq x \leq 12$, find all intervals for which $g(x) \leq 0$.

(a)	$g'(x) = f(x)$ f(x) is not changing signs at x = 10 so there is neither a minimum nor maximum	2 : { 1 : $g'(x) = f(x)$ 1 : answer
(b)	$g'(x) = f(x)$, $g''(x) = f'(x)$, a point of inflection occurs when the second derivative changes signs, at x = 4, $f(x)$ has a maximum, meaning $f'(x)$ goes from positive to negative.	2 : { 1: $g''(x) = f'(x)$ 1: answer
(c)	$g'(x) = f(x)$ which changes sign at x = -2, x = 6, and the end points x = 4, x = 12 $g'(-2) = \int_2^{-2} f(t)\, dt$ = -8 $g'(-4) = \int_2^{-4} f(t)\, dt$ = -4 $g'(6) = \int_2^{6} f(t)\, dt$ = 8 $g'(12) = \int_2^{12} f(t)\, dt$ = -4	4 : { 1 : changing signs 1 : x = -2, x = -6 and endpoints 1 : integrals 1 : answer
(d)	[-4 , 2] U [10 , 12]	1 : answer