

NAME Jay D
 AP Calculus

DATE _____
 FRQ #29

Tables

x	0	$0 < x < 1$	1	$1 < x < 2$	2	$2 < x < 3$	3	$3 < x < 4$
$f(x)$	-1	Negative	0	Positive	2	Positive	0	Negative
$f'(x)$	4	Positive	0	Positive	DNE	Negative	-3	Negative
$f''(x)$	-2	Negative	0	Positive	DNE	Negative	0	Positive

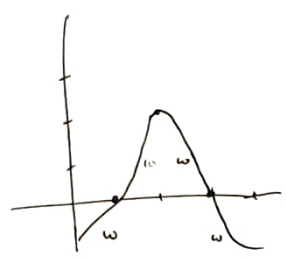
Let f be a function that is continuous on the interval $[0,4]$. The function f is twice differentiable except at $x = 2$. The function f and its derivatives have the properties indicated in the table, where DNE indicates that the derivatives of f do not exist at $x = 2$.

- (a) For $0 < x < 4$, find all values of x at which f has a relative extremum. Determine whether f has a relative maximum or a relative minimum at each of these values. Justify.

$f'(x) = 0$ or DNE at $x = 1, 2$

Rel max at $x = 2$ as $f'(x)$ changes from + to -

- (b) On the axis provided, sketch the graph of a function that has all the characteristics of f .



- (c) Let g be the function defined by $g(x) = \int_1^x f(t) dt$ on the open interval $(0,4)$. For $0 < x < 4$, find all values of x at which g has a relative extremum. Determine whether g has a relative maximum or a relative minimum at each of these values. Justify your answers.

$g(x) = \int_1^x f(t) dt$

$x = 3$; $f(x)$ changes from + to -
 (max)

$g'(x) = f(x) = 0$ or DNE at $x = 1$ or 3

$x = 1$; $f(x)$ changes from - to + (min)

- (d) For the function g defined in part (c), find all values of x , for $0 < x < 4$, at which the graph of g has a point of inflection. Justify.

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

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

$f'(x) = 0$ or DNE

IP

$x = 1, 2$

sign change at 2