AP CALCULUS AB Dr. Paul L. Bailey

Homework 0430d Wednesday, April 30, 2020

**Problem 1.** 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 below, where DNE indicates that the derivatives of f do not exist at x = 2.

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

(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 your answer.

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



**Problem 1** (continued). 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 below, where DNE indicates that the derivatives of f do not exist at x = 2.

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

(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 answer.

(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 your answer.