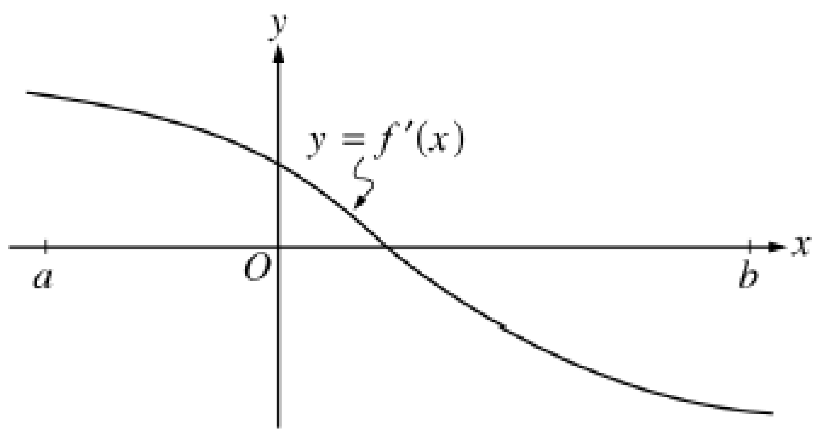
1) Let f be the function defined by $f(x) = -3 + 6x^2 - 2x^3$. What is the largest open interval on which the graph of f is both concave up and increasing?

(A) $(0, 1)$ (B) $(1, 2)$ (C) $(0, 2)$ (D) $(2, \infty)$

2)



The graph of f', the derivative of the function f, is shown in the figure above. Which of the following statements must be true?

I. f is continuous on the open interval (a, b).

II. f is decreasing on the open interval (a, b).

III. The graph of f is concave down on the open interval (a, b).

(A) I only

(B) I and II only

(C) I and III only

(D) II and III only

3) CALCULATOR

The function f has first derivative given by $f'(x) = x^4 - 6x^2 - 8x - 3$. On what intervals is the graph of f concave up?

(A) $(2, \infty)$ only

(B) $(0, \infty)$

(C) $(-1, 2)$

(D) $(-\infty, -1)$ and $(3, \infty)$

4) CALCULATOR

Let f be a function with derivative given by $f'(x) = \dfrac{x^3 - 8x^2 + 3}{\sqrt{x^3 + 1}}$ for $-1 < x < 9$. At what value of x does f attain a relative maximum?

(A) -0.591 (B) 0 (C) 0.638 (D) 7.953

5) CALCULATOR

$$f''(x) = x(x-1)^2(x+2)^3$$
$$g''(x) = x(x-1)^2(x+2)^3 + 1$$
$$h''(x) = x(x-1)^2(x+2)^3 - 1$$

The twice-differentiable functions f, g, and h have second derivatives given above. Which of the functions f, g, and h have a graph with exactly two points of inflection?

(A) g only

(B) h only

(C) f and g only

(D) f, g, and h

6)

x	1	2	3	4	5
$f(x)$	9	4	0	–3	–5

The table above gives values of a function f at selected values of x. If f is twice-differentiable on the interval $1 \le x \le 5$, which of the following statements could be true?

(A) f' is negative and decreasing for $1 \le x \le 5$.

(B) f' is negative and increasing for $1 \le x \le 5$.

(C) f' is positive and decreasing for $1 \le x \le 5$.

(D) f' is positive and increasing for $1 \le x \le 5$.