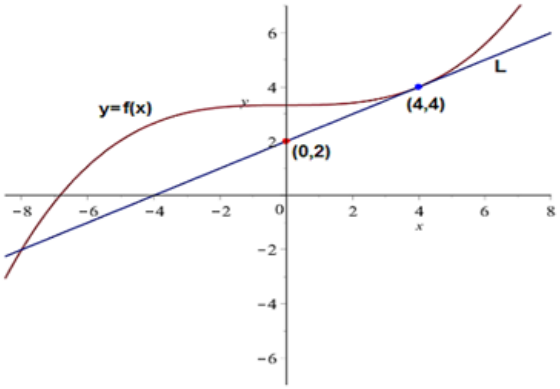
1. Using the values of the continuous function $f(x)$ given in the table, approximate the value of its derivative at the point $x = 2$.

x	1,9	1,99	1,999	2	2,0001	2,001	2,1
$f(x)$	3,61	3,9601	3,996001	4	4,00040001	4,004001	4,41

2. Assume that the line L is tangent to the graph of the function f at the point (4,4), as shown in the figure. Find $f'(4)$.



3. True or False?

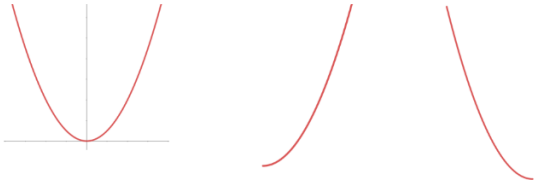
Statement 1: Let $f: \mathbb{R} \to \mathbb{R}$ be a continuous function. If $(x_0, f(x_0))$ is a minimum point, then $f'(x_0) = 0$.

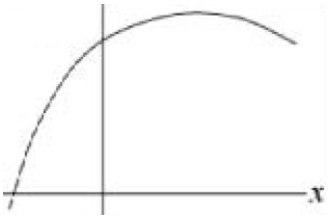
True / False

Statement 2: Let $f: \mathbb{R} \to \mathbb{R}$ be a differentiable function. If $f'(x_0) = 0$, then $(x_0, f(x_0))$ is a minimum or maximum point.

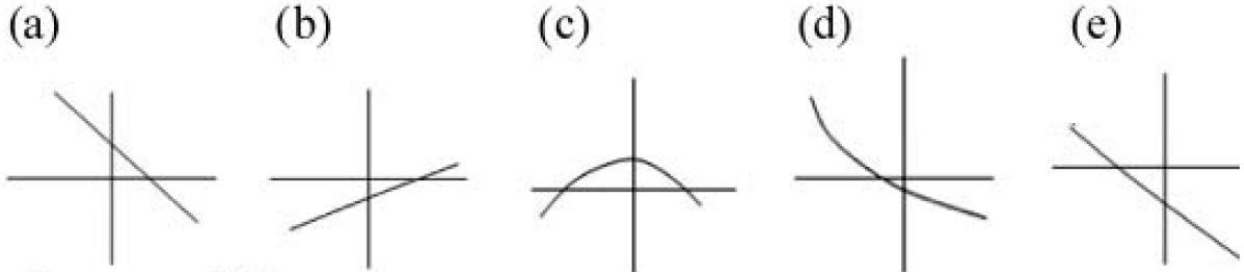
True / False

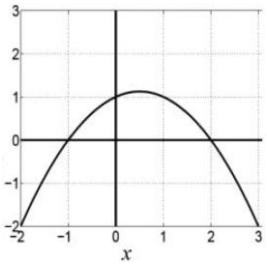
4. Explain why the second derivative is positive if the function has the following graph.



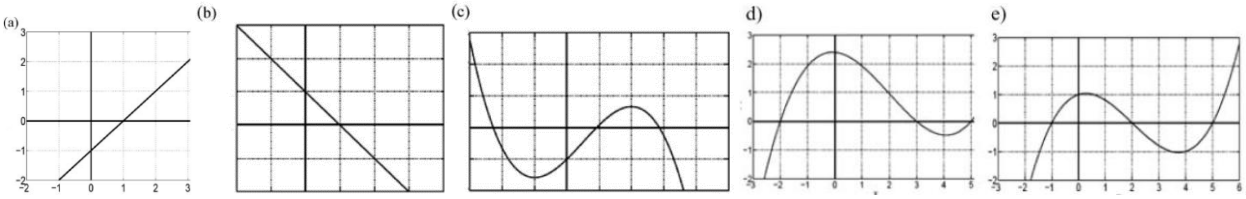


5. The graph of the function f is shown below. Which option from (a) to (e) could represent the graph of f'?

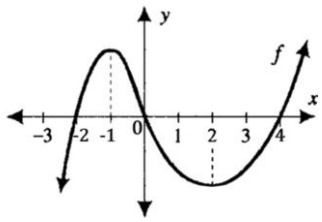




6. The graph of f' is shown. Which option from (a) to (e) could represent the graph of f?



7. (Homework) Based on the given graph of the function f, determine:



a. The intervals on which f is increasing and decreasing.

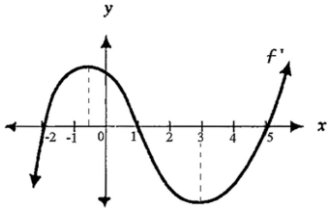
b. The point at which the function f has a local maximum and a local minimum.

c. The coordinates of the inflection points of f.

d. The intervals on which the function f is concave and convex.

e. Draw a possible graph of the derivative f'.

8. (Homework) Given the graph of the derivative f', sketch a possible graph of the function f. Explain your reasoning and also determine:



a. The intervals where f is increasing or decreasing.

b. The maximum or minimum values of f.

c. The inflection points.

d. The intervals where f is convex or concave.

9. Sketch the graph of a function f that satisfies the following conditions:

The function f is continuous.

$f(0) = 2, f'(-2) = f'(3) = 0$, a $\lim_{x \to 0} f'(x) = \infty$

$f'(x) > 0$ when $-4 < x < -2$, and when $-2 < x < 3$,

$f'(x) < 0$ when $x < -4$, and when $x > 3$,

$f''(x) < 0$ when $x < -4$, when $-4 < x < -2$, and when $0 < x < 5$,

$f''(x) > 0$ when $-2 < x < 0$, and when $x > 5$,

$\lim_{x \to -\infty} f(x) = \infty$ and $\lim_{x \to \infty} f(x) = -2$

10. The figure below shows the graph of the function f. Sketch the graph of its derivative.