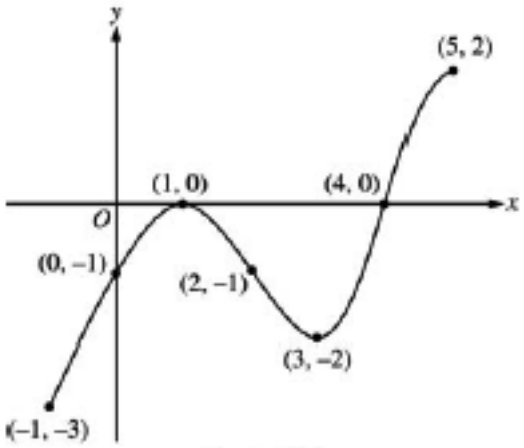
1. Let f be the function given by $f(x) = x^3 - 7x + 6$.

a. Find the Zeros of f.

b. Write an equation of the line tangent to the graph of f at $x = -1$

c. Find the number c that satisfies the conclusion of the Mean Value Theorem for f on the closed interval [1, 3].

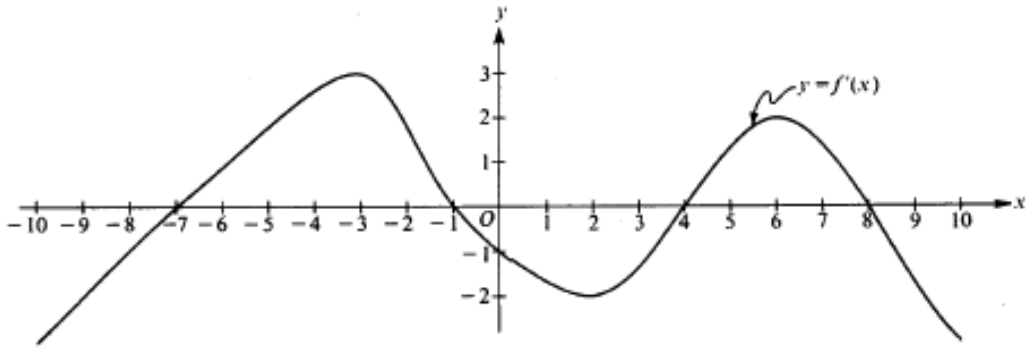
2.



The figure above shows the graph of f ‘, the derivative of the function f, on the closed interval $-1 \le x \le 5$. The graph of f ‘ has horizontal tangent lines at $x = 1$ and $x = 3$. The function f is twice differentiable with $f(2) = 6$.

a. Find the x-coordinate of each of the points of inflection of the graph of f. Give a reason for your answer.
b. At what value of x does f attain its absolute minimum value on the closed interval $-1 \le x \le 5$? At what value of x does f attain its absolute maximum value on the closed interval $-1 \le x \le 5$? Show the analysis that leads to your answers.
c. Let g be the function defined by $g(x) = x f(x)$. Find the equation for the line tangent to the graph of g at $x = 2$.

3.



Note: This is the graph of the derivative of f, not the graph of f.

a. For what values of x does the graph of f have a horizontal tangent? Justify your answer.

b. For what values of x in the interval (-10, 10) does f have a relative maximum? Justify your answer.

c. For what value of x is the graph of f concave downward? Justify your answer.

4. A particle moves along the x-axis in such a way that its acceleration at time t for $t \geq 0$ is given by $a(t) = 4\cos(2t)$. At time $t = 0$, the velocity of the particle is $v(0) = 1$ and its position is $x(0) = 0$.

a. Write an equation for the velocity v(t) of the particle.

b. Write an equation for the position x(t) of the particle.

c. For what values of t, $0 \leq t \leq \pi$, is the particle at rest?