

Exercise sheet 4.2, part II

1) Find the global minimum of the functions $f(x) = (x - 1)^2$, $g(x) = (x - 1)^3$ and $h(x) = -(x - 1)^4$ on $[0, 2]$.

2) Draw the signe table of f' , g' and h' on $[0, 2]$.

3) Draw the variation table of f , g and h on $[0, 2]$.

3) How does the sign of f' and h' changes at 1?

4) Why is 1 not a local extremum of g ?

Theorem. Suppose that f is continuous on an interval that contains a critical point c and that f is differentiable around c , except possibly at c . Then,

if f' changes sign from positive to negative at c , then $f(c)$ is a local minimum of f

if f' changes sign from negative to positive at c , then $f(c)$ is a local maximum of f

if f' does not change sign at c , then $f(c)$ is not a local extremum of f

Consider the function $k(x) = 3x^4 - 4x^3 - 6x^2 + 12x + 1$.

5) What is the monotonicity of k ?

6) Identify the local extrema of k .