Answer to Question #84751 - Math - Calculus

Consider the function

$f(x) = x^2 - 2x + 7$

First Derivative Test definition :

Suppose that $x = c$ is a critical point of $f(x)$ then,

If $f'(x) > 0$ to the left of $x = c$ and $f'(x) < 0$ to the right of $x = c$ then $x = c$ is a local maximum.

If $f'(x) < 0$ to the left of $x = c$ and $f'(x) > 0$ to the right of $x = c$ then $x = c$ is a local minimum.

If $f'(x)$ is the same sign on both sides of $x = c$ then $x = c$ is neither a local maximum nor a local minimum.

Critical points are points where the function is defined and its derivative is zero or undefined

Differentiate the function with respect to x we get

$f'(x) = 2x - 2 = 0$

$\Rightarrow x = 1$

Domain of $x^2 - 2x + 7$: $-\infty < x < \infty$

The function monotone intervals are :

$-\infty < x < 1,\ 1 < x < \infty$

Check the sign of $2x - 2$ at $-\infty < x < 1$: Negative

Check the sign of $2x - 2$ at $1 < x < \infty$: Positive

Hence, function is increasing at $[1, \infty)$

Hence, function is decreasing at $(-\infty, 1)$

Thus, the function is monotonic at $[1, +\infty)$.