

**Example 33** Find all the points of local maxima and local minima of the function  $f$  given by

$$f(x) = 2x^3 - 6x^2 + 6x + 5.$$

**Solution** We have

$$f(x) = 2x^3 - 6x^2 + 6x + 5$$

or

$$\begin{cases} f'(x) = 6x^2 - 12x + 6 = 6(x-1)^2 \\ f''(x) = 12(x-1) \end{cases}$$

Now  $f'(x) = 0$  gives  $x = 1$ . Also  $f''(1) = 0$ . Therefore, the second derivative test fails in this case. So, we shall go back to the first derivative test.

We have already seen (Example 30) that, using first derivative test,  $x = 1$  is neither a point of local maxima nor a point of local minima and so it is a point of inflexion.