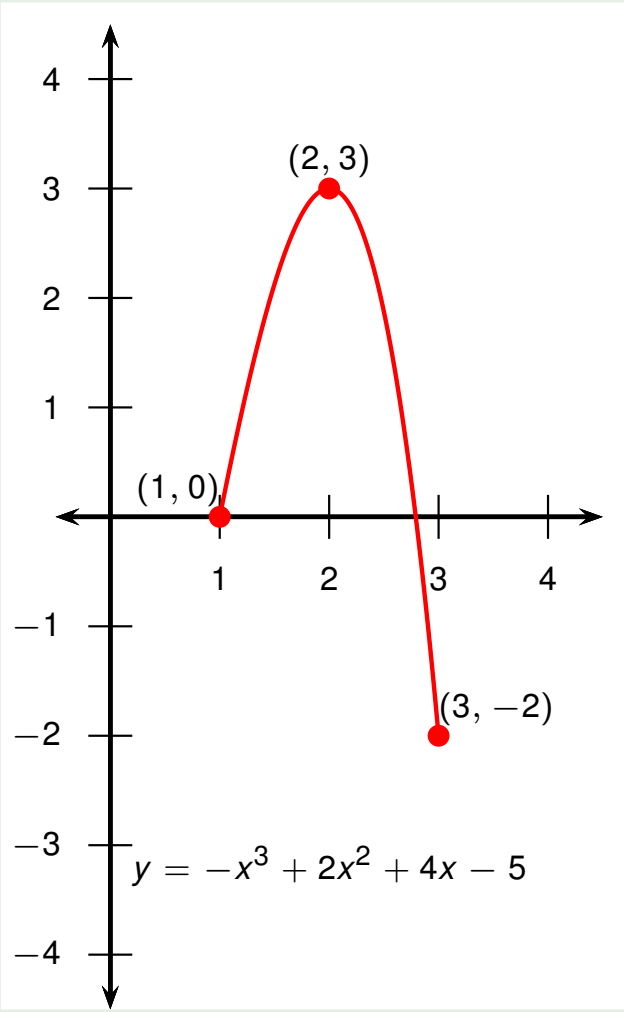
Calculus I
Maxima and minima of polynomials over closed intervals

Todor Milev

2019

Example

Find the maximum and minimum values of the function $f(x) = -x^3 + 2x^2 + 4x - 5$ on the interval $[1, 3]$.



$$f'(x) = -3x^2 + 4x + 4$$
$$= (-3x - 2)(x - 2)$$

If $f'(x) = 0$, $x = -\frac{2}{3}$ or 2.

Need to check:

1. The critical numbers of f in $[a, b]$.
2. The endpoints a and b.

x	$f(x)$
1	0
2	3
3	−2

Maximum on $[1, 3]$: 3. Minimum on $[1, 3]$: -2.