
Maximum and Minimum Values

Solutions should show all of your work, not just a single final answer.

1. For the following functions, find all critical points **exactly**.

(a) $f(x) = x^5 - 2x^3$

(b) $f(x) = x - 2 \sin x$ for $-2\pi \leq x \leq 2\pi$

(c) $f(x) = e^{-x} - e^{-3x}$

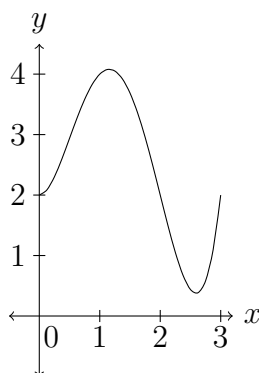
2. Use calculus to find the absolute maximum and minimum values of the following functions on the given intervals. Give your answers **exactly** and show supporting work.

(a) $f(x) = x^3 - 2x^2 + x + 1$ on $[0, 1]$

(b) $f(x) = x^4 - 2x^2 + 4$ on $[0, 2]$

(c) $f(x) = (7x - 1)e^{-2x}$ on $[0, 1]$

3. Below is the graph of $f(x) = x^4 - 5x^3 + 6x^2 + 2$. On the interval $[0, 3]$ determine the maximum and minimum value of the *slope* of the graph, *i.e.*, the maximum and minimum values of $g(x) = f'(x)$.



4. T/F (with justification) If $f(x)$ is a differentiable function and $f(x)$ has a local maximum or minimum value at $x = a$ then $f'(a) = 0$.
5. T/F (with justification) If $f(x)$ is a differentiable function and $f'(a) = 0$ then $f(x)$ has a local maximum or minimum value at $x = a$.