

MA 16010 Lesson 20: Absolute extrema on an interval

The **absolute maximum** of $y = f(x)$ on an interval I is:

The **absolute minimum** of $y = f(x)$ on an interval I is:

Examples:

for $f_1(x)$:

for $f_2(x)$:

for $g_1(x)$:

for $g_2(x)$:

Observations:

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Absolute extrema on a closed (and bounded) interval

Fact:

How to find them:

- 1.
- 2.
- 3.

Exercise: Find the abs. maximum and the abs. minimum of the function

$$f(x) = x^4 - 18x^2 + 5$$

on the interval $[-4, 6]$.

Exercise: Find the abs. maximum and the abs. minimum of the function

$$f(x) = 2x^3e^x + 7$$

on the interval $[-4, -2]$.

Exercise: Find the abs. maximum and the abs. minimum of the function

$$f(x) = \frac{2}{2x^2 + 3}$$

on the interval $[-1, 1]$.

Absolute extrema on a general (bounded) interval

We consider the **special case**: only one critical point in the interior of I

In this case: if the crit. point is a relative min/max, then it is also the absolute min/max!

Exercise: (If it exists,) find the abs. minimum of the function

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

on the interval $[0, 2)$.