

edoceralph

Extremwerte:

$$f'(x) = 0$$

$$f''(x) \neq 0$$

Aufgabe 1

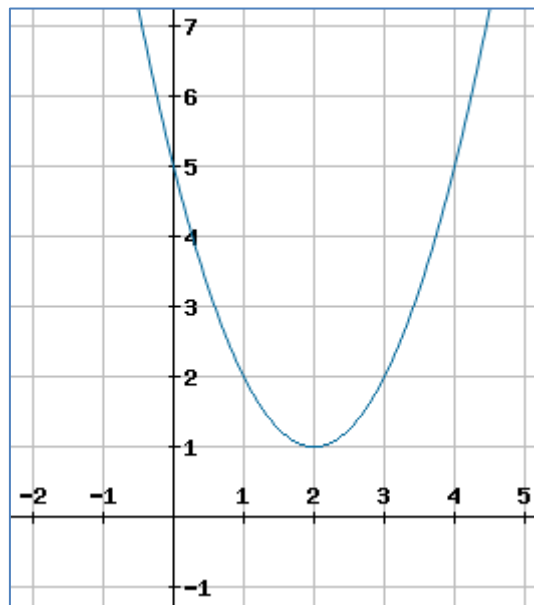
$$f(x) = x^2 - 4x + 5$$

$$f'(x) = 2x - 4 = 0 \quad \Rightarrow \quad x = 2$$

$$f''(x) = 2 \quad \Rightarrow \quad f''(2) = 2 \quad \Rightarrow \text{Min}$$

$$f(2) = 4 - 8 + 5 = 1$$

Min (2|1)



Aufgabe 2

$$f(x) = 2x^3 - 9x^2 + 12x + 2$$

$$f'(x) = 6x^2 - 18x + 12 = 0 \quad \Rightarrow \quad x_1 = 1; \quad x_2 = 2$$

$$f''(x) = 12x - 18 \quad \Rightarrow \quad f''(1) = -6 \quad \Rightarrow \text{Max}$$

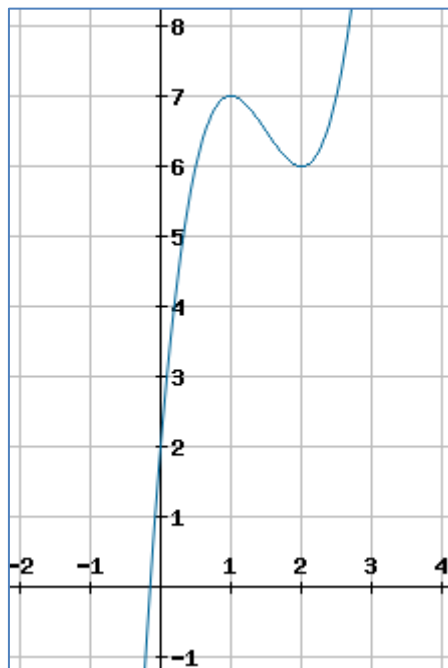
$$\Rightarrow \quad f''(2) = 6 \quad \Rightarrow \text{Min}$$

$$f(1) = 2 - 9 + 12 + 2 = 7$$

$$f(2) = 16 - 36 + 24 + 2 = 6$$

Max (1|7)

Min (2|6)



Aufgabe 3

$$f(x) = -3 \cos(2x)$$

$$f'(x) = 6 \sin(2x) = 0$$

$$2x_k = k\pi \quad \Rightarrow \quad x_k = \frac{k}{2}\pi$$

k ist gerade:

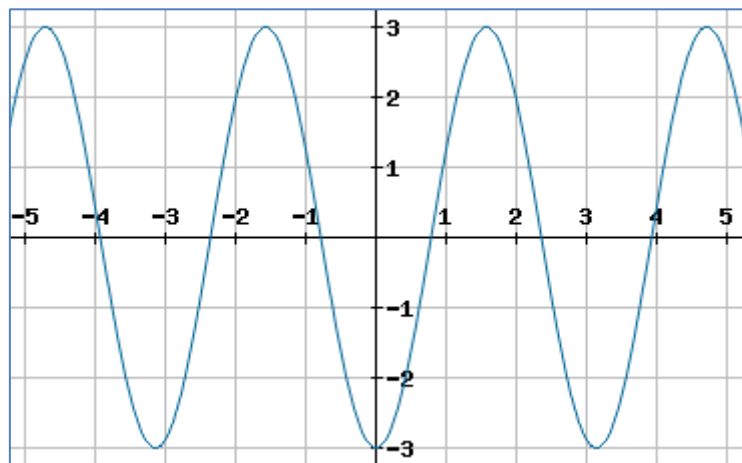
$$f''\left(\frac{k}{2}\pi\right) = 12 \cdot \cos\left(\frac{k}{2}\pi\right) = 12 \Rightarrow \text{Min}$$

$$f\left(\frac{k}{2}\pi\right) = -3 \cdot \cos\left(\frac{k}{2}\pi\right) = -3 \quad \Rightarrow \quad \boxed{\text{Min}\left(\frac{k}{2}\pi \mid -3\right)}$$

k ist ungerade:

$$f''\left(\frac{k}{2}\pi\right) = 12 \cdot \cos\left(\frac{k}{2}\pi\right) = -12 \Rightarrow \text{Max}$$

$$f\left(\frac{k}{2}\pi\right) = -3 \cdot \cos\left(\frac{k}{2}\pi\right) = 3 \quad \Rightarrow \quad \boxed{\text{Max}\left(\frac{k}{2}\pi \mid 3\right)}$$



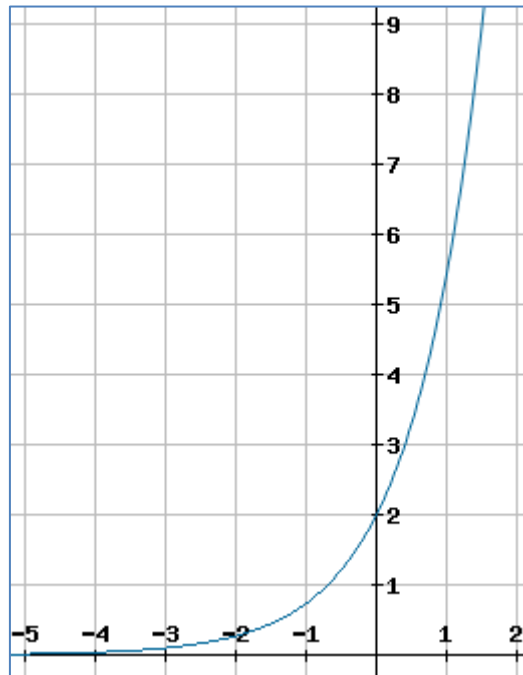
Aufgabe 4

$$f(x) = 2e^x$$

$$f'(x) = 2e^x = 0$$

=> keine Lösung

=> kein Extremwert



Aufgabe 5

$$f(x) = e^{x^2}$$

$$f'(x) = 2x \cdot e^{x^2} = 0$$

=> $x = 0$

$$f''(x) = e^{x^2} \cdot (4x^2 + 2)$$

=> $f''(0) = 2 \Rightarrow \text{Min}$

$$f(0) = 1$$

Min (0|1)

