

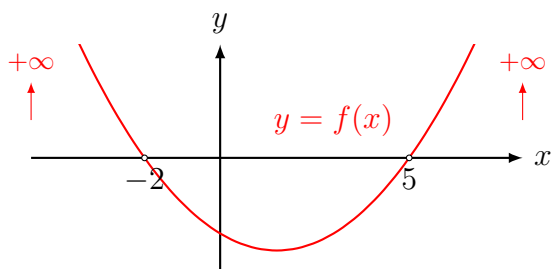
Aufgabe 1

$$f(x) = x^2 - 3x - 10 = (x + 2)(x - 5)$$

Nullstellen: $x_1 = -2$, $x_2 = 5$

$$\lim_{x \rightarrow -\infty} f(x) = \lim_{x \rightarrow -\infty} x^2 = +\infty$$

$$\lim_{x \rightarrow +\infty} f(x) = \lim_{x \rightarrow +\infty} x^2 = +\infty$$

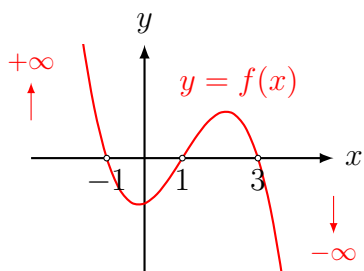
**Aufgabe 2**

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

Nullstellen: $x_1 = -1$, $x_2 = 1$, $x_3 = 3$

$$\lim_{x \rightarrow -\infty} f(x) = \lim_{x \rightarrow -\infty} (-x^3) = +\infty$$

$$\lim_{x \rightarrow +\infty} f(x) = \lim_{x \rightarrow +\infty} (-x^3) = -\infty$$



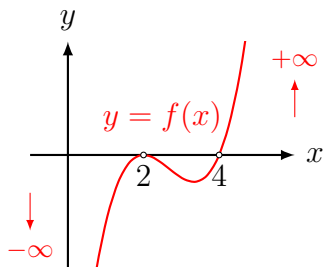
Aufgabe 3

$$f(x) = x^3 - 8x^2 + 20x - 16$$

Nullstellen: $x_1 = x_2 = 2$ (doppelt!), $x_3 = 4$

$$\lim_{x \rightarrow -\infty} f(x) = \lim_{x \rightarrow -\infty} x^3 = -\infty$$

$$\lim_{x \rightarrow +\infty} f(x) = \lim_{x \rightarrow +\infty} x^3 = +\infty$$



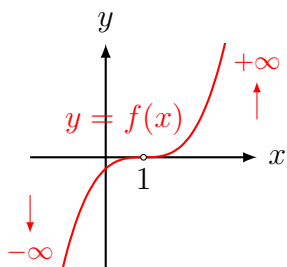
Aufgabe 4

$$f(x) = x^3 - 3x^2 + 3x - 1$$

Nullstellen: $x_1 = x_2 = x_3 = 1$ (dreifach!)

$$\lim_{x \rightarrow -\infty} f(x) = \lim_{x \rightarrow -\infty} x^3 = -\infty$$

$$\lim_{x \rightarrow +\infty} f(x) = \lim_{x \rightarrow +\infty} x^3 = +\infty$$



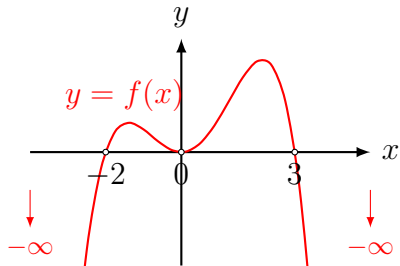
Aufgabe 5

$$f(x) = -x^4 + x^3 + 6x^2 = -x^2(x^2 - x - 6) = -x^2(x + 2)(x - 3)$$

Nullstellen: $x_1 = -2$, $x_2 = x_3 = 0$, $x_4 = 3$

$$\lim_{x \rightarrow -\infty} f(x) = \lim_{x \rightarrow -\infty} (-x^4) = -\infty$$

$$\lim_{x \rightarrow +\infty} f(x) = \lim_{x \rightarrow +\infty} (-x^4) = -\infty$$



Die relative Höhe der Extrempunkte lässt sich aus den relativen Abständen zwischen den jeweiligen benachbarten Nullstellen ableiten. (→ Aufgabe 2)