Problem 1-1

$$f(x) := -x^2$$

$$\frac{d}{dx} f(x) \to -(2 \cdot x)$$

$-x^2$

The function is NOT eventually nondecreasing
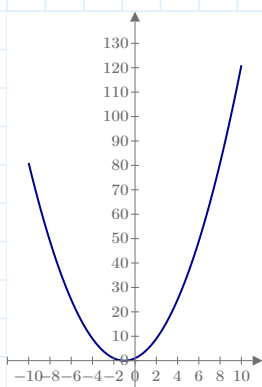
Problem 1-2

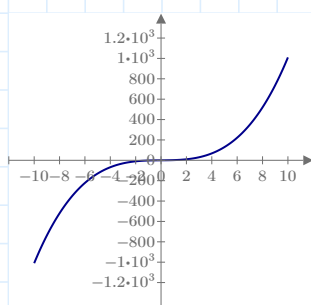$$f(x) := x^2 + 2\,x + 1$$

$$\frac{d}{dx} f(x) \to 2 \cdot x + 2$$

$x^2 + 2\,x + 1$

The function is eventually nondecreasing

from the graph it started decreasing on $(-\infty, 0)$ but eventually increasing on the $[0, \infty)$

also observing the derivative, the slope of the tangent is -ve for -ve values of x and +ve for +ve values of x

Problem 1-3

$$f(x) := x^3 + x$$

$$\frac{d}{dx} f(x) \to 3 \cdot x^2 + 1$$

$x^3 + x$

The function is increasing (monotonous)

from the graph and also from the derivative, the slope of the tangent is positive for all x belongs to $\mathbb{R}$