Excercise 1.

Derive approximate formulas for $\sin x$ in the interval $[0, \pi/2]$. Create numerical implementation using:

- interpolating polynomial,
- Maclaurin (at $x = 0$) and/or Taylora expansions,
- interpolating polynomial, assuming derivatives at the ends of the interval are known,
- expanding in the Legendere polynomial base,
- using Chebyshev (MinMax) approximation,
- using linear interpolation, e.g, GNU GSL,
- using higher-order polynomial interpolation,
- using spline interpolation,
- using Bernstein polynomials.

Compare your implementation with built-in library $\sin x$. Determine maximum relative and absolute errors. Verify condition $0 \leqslant \sin x \leqslant 1$.

Excercise 2.

Redo analysis from Excercise 1 for function:

$$f(x) = \frac{1}{1 + \pi^2 x^2}$$

in the interval $-\pi \leqslant x \leqslant \pi$.

Excercise 3.

Redo analysis from Excercise 1 for some non-trvial, e.g: special function in choosen interval.