3. Polynomial interpolation

Files: The accompanying files for this assignments are `assignment3_1.html` and `assignment3_2.html`.

Delivery: upload the modified HTML files and any other necessary files to the Racó. All explanations and/or answers to the problems should be included in the HTML files.

Problem 1. Write a program to draw a cubic Lagrange polynomial that interpolates four points, using:

1. Uniform parameter values.

2. Non-uniform parameter values, using the distance between consecutive interpolated points.

3. Non-uniform parameter values, using some other criterion of your choice.

You can draw all three curves at the same time, using different colors.

Problem 2. In this problem we want to explore Runge's phenomenon. You will write a program to draw a Lagrange polynomial to interpolate $n+1$ points, and use it to interpolate samples from the function $f(x) = \frac{1}{1+25x^2}$, for different values of n.

The points to be interpolated, $\{x_1, \ldots, x_n\}$, will be samples from the graph of the function $f(x) = \frac{1}{1+25x^2}$ taken uniformly from the interval $[-1, 1]$. That is: $x_i = 2i/n - 1$.

1. Write a program to draw a Lagrange polynomial to interpolate $n+1$ points.

2. Use the Lagrange polynomial to interpolate the points $\{x_1, \ldots, x_n\}$, for different values of n (make n a user-defined parameter that can be changed interactively).

3. Draw the graph of $f(x)$ in the background, in order to compare better the different interpolating curves.

Note: you should translate and rescale your canvas or curve appropriately to be able to see it in your program.