Examples

- Consider the case $n = 1$, i.e., two points $(2, 2.5)$ and $(3, 4)$ are to be interpolated.

  ◇ The two Lagrange polynomials are easy to construct.

$$\begin{aligned} \ell_0(t) &= \frac{t-3}{2-3} \\ \ell_1(t) &= \frac{t-2}{3-2}. \end{aligned}$$

  ◇ Their geometry is sketched below.

Figure 1: First degree Lagrange polynomials.

  ◇ The straight line that interpolates the two given nodes can be obtained by linearly combined $\ell_0(t)$ and $\ell_1(t)$ together. (Imagine workers in a circus set up the tent by first lifting up the poles to the desirable heights.)

- Consider the case $n = 2$ where three points $(2, 2.5)$, $(3, 4)$ and $(3.5, 3)$ are to be interpolated.
  - ◇ Write a MATLAB program to generate and plot the three Lagrange polynomials (A good exercise for you!)

Figure 2: Second degree Lagrange polynomials.

  - ◇ The resulting quadratic polynomial is done by

$$p(t) = \sum_{i=0}^{2} f_i \ell_i(t).$$