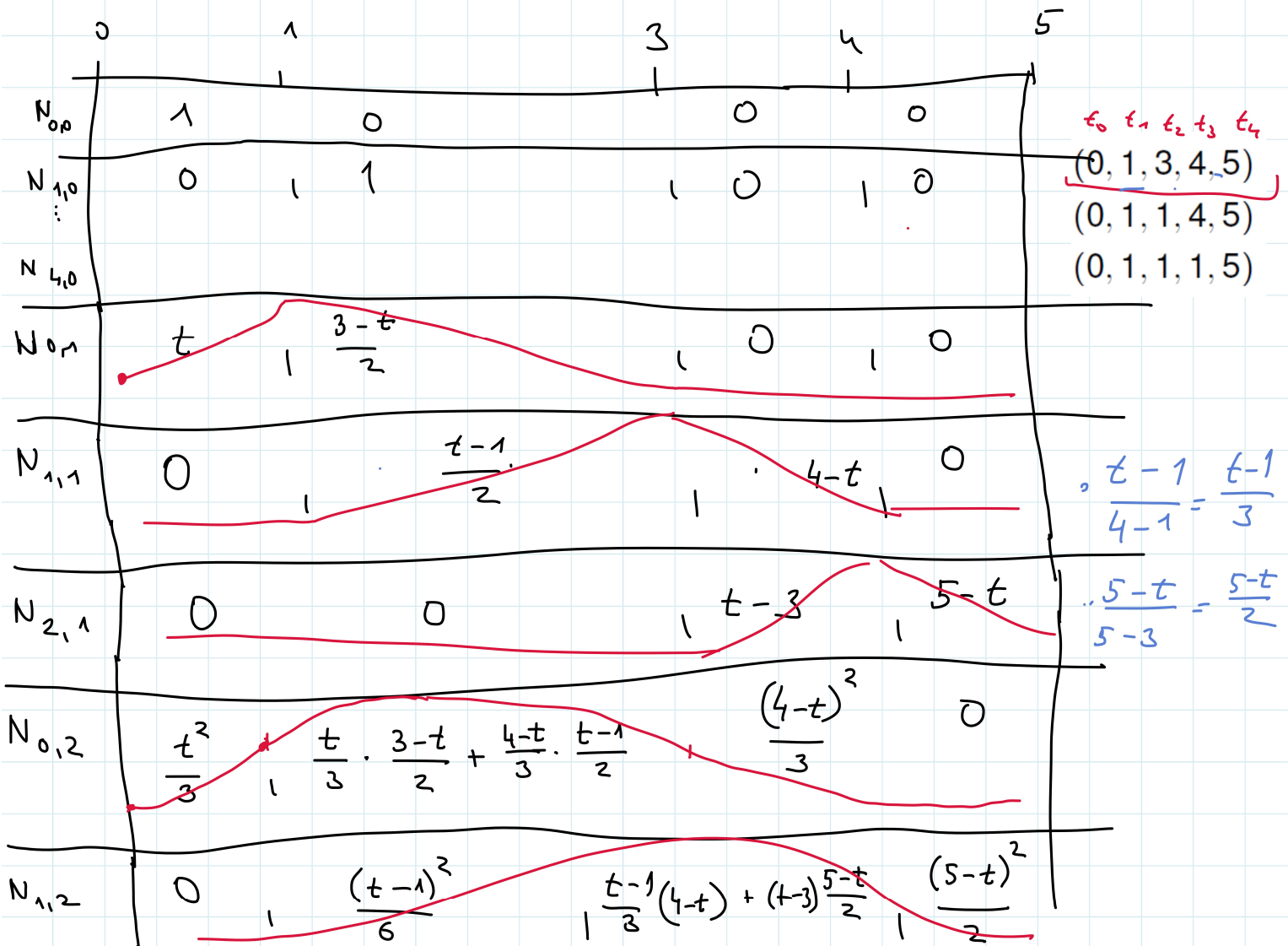


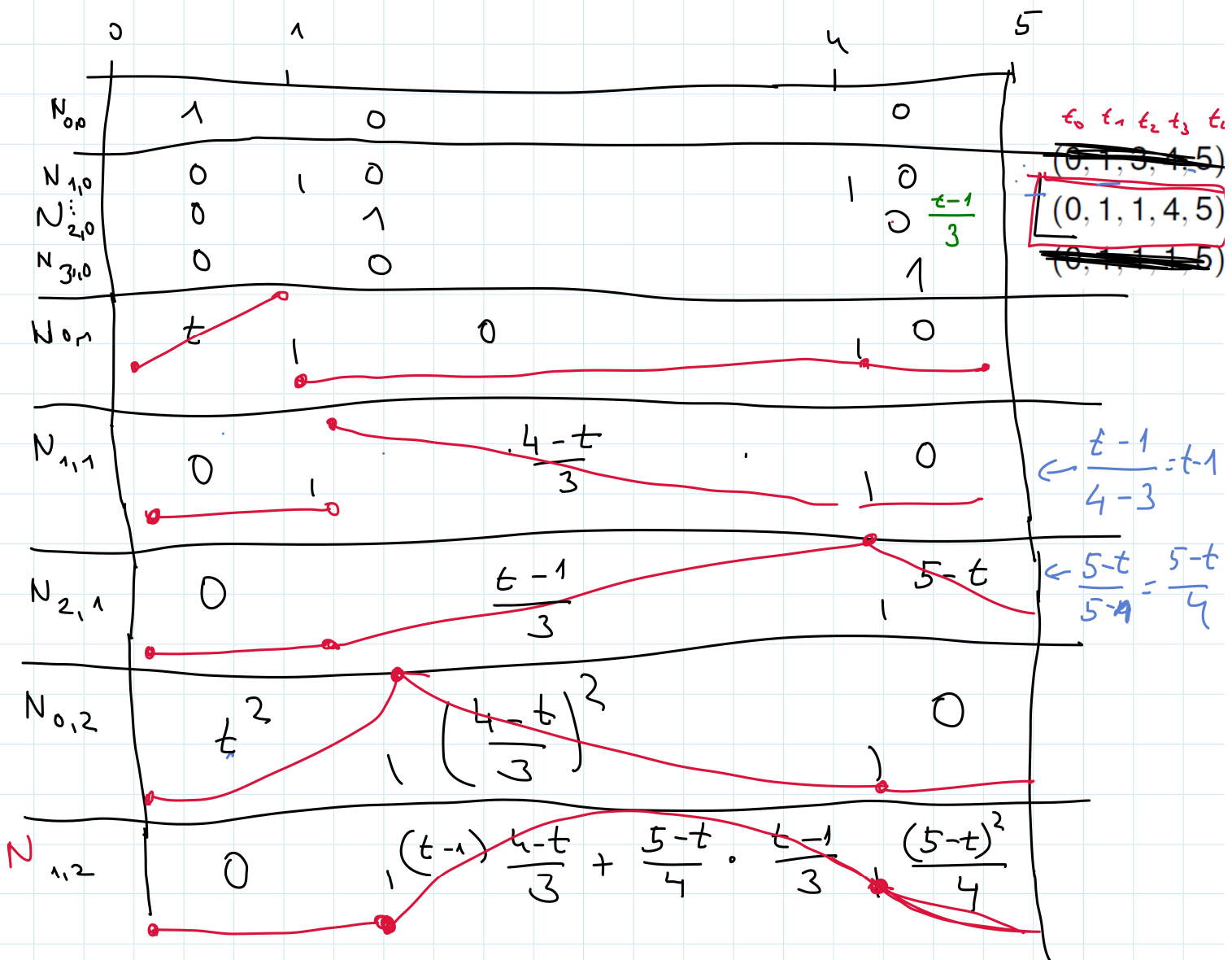
$$N_{i,0}(t) = \begin{cases} 1 & t \in [t_i, t_{i+1}) \\ 0 & \text{jinde} \end{cases}$$

$$N_{i,p}(t) = \frac{t - t_i}{t_{i+p} - t_i} N_{i,p-1}(t) + \frac{t_{i+p+1} - t}{t_{i+p+1} - t_{i+1}} N_{i+1,p-1}(t)$$

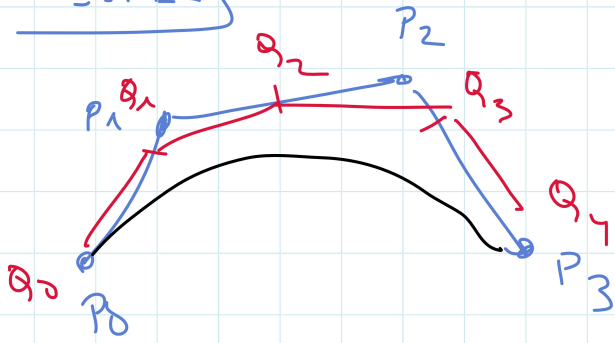


$$N_{i,0}(t) = \begin{cases} 1 & t \in [t_i, t_{i+1}) \\ 0 & \text{jinde} \end{cases}$$

$$N_{i,p}(t) = \frac{t - t_i}{t_{i+p} - t_i} N_{i,p-1}(t) + \frac{t_{i+p+1} - t}{t_{i+p+1} - t_{i+1}} N_{i+1,p-1}(t)$$



BEHIER

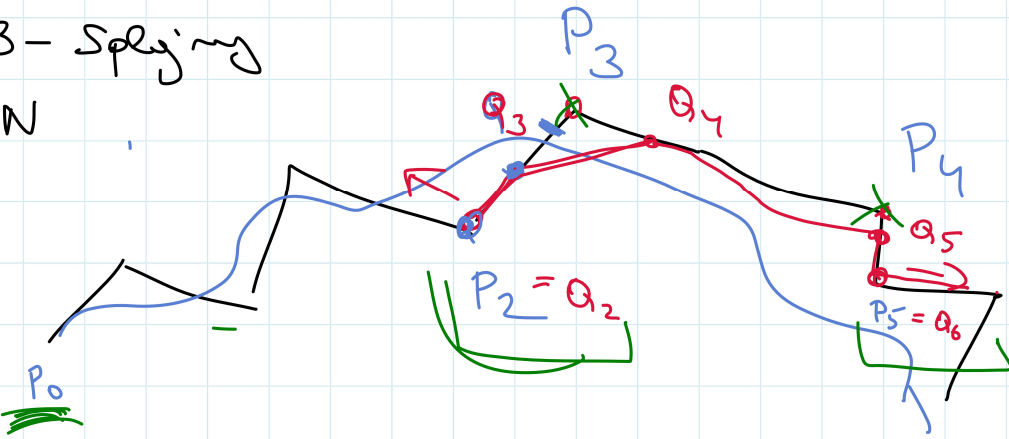


$$\frac{\frac{1}{2} - 0}{\frac{2}{3} - 0} = \frac{5}{6}$$

$$Q_3 = \frac{1}{6} \cdot P_2 = \frac{5}{6} \cdot P_3$$

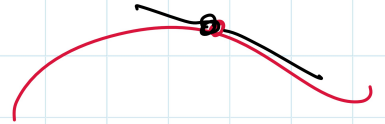
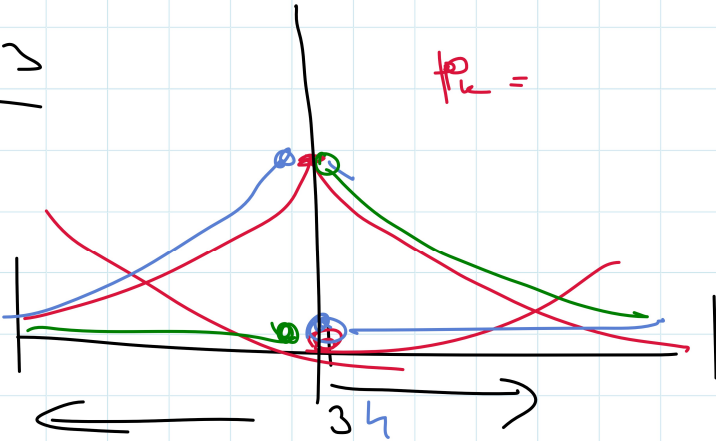
B-Splining

N



P=2

P=2



$$\{B\} = [N_0, \dots, N_7] \\ \begin{pmatrix} p_0 \\ \vdots \\ p_7 \end{pmatrix} = f = \underline{B_2} \cdot \begin{pmatrix} a_0 \\ \vdots \\ a_6 \end{pmatrix}$$

$$\begin{matrix} \text{B}_1 \\ \text{B}_2 \end{matrix} M \cdot \begin{pmatrix} p_0 \\ \vdots \\ p_7 \end{pmatrix} = \text{B}_2 \begin{pmatrix} a_0 \\ \vdots \\ a_6 \end{pmatrix}$$

8×8 8×1 9×1

$$[id]_{B_2}^{B_1} = \left\{ [N_0]_{B_2} \mid \dots \mid [N_7]_{B_2} \right\}$$

(* pracujeme s BSpline bází *)

In[1]:= **knots** = {0, 0, 0, 0, 1/5, 2/5, 3/5, 4/5, 1, 1, 1, 1}

Out[1]= {0, 0, 0, 0, 1/5, 2/5, 3/5, 4/5, 1, 1, 1, 1}

In[2]:= **p** = 3

Out[2]= 3

In[3]:= **m** = Length[knots] - 1

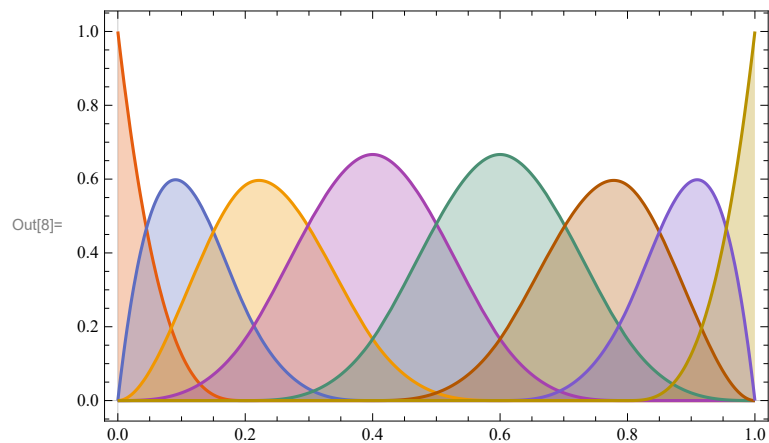
Out[3]= 11

In[4]:= **n** = m - p - 1

Out[4]= 7

In[7]:= **B1** = Table[BSplineBasis[{p, knots}, i, t], {i, 0, n}];

In[8]:= Plot[Evaluate[B1], {t, First[knots], Last[knots]},
Filling -> Axis, PlotRange -> Full, PlotTheme -> "Scientific"]



In[9]:= **knots** = {0, 0, 0, 0, 1/5, 2/5, 1/2, 3/5, 4/5, 1, 1, 1, 1}

Out[9]= {0, 0, 0, 0, 1/5, 2/5, 1/2, 3/5, 4/5, 1, 1, 1, 1}

In[10]:= **p** = 3

Out[10]= 3

In[11]:= **m** = Length[knots] - 1

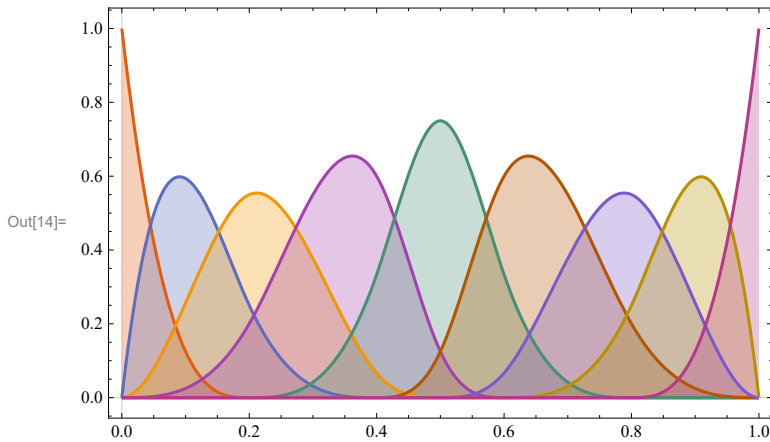
Out[11]= 12

In[12]:= **n** = m - p - 1

Out[12]= 8

In[13]:= **B2** = Table[BSplineBasis[{p, knots}, i, t], {i, 0, n}];

```
In[14]:= Plot[Evaluate[B2], {t, First[knots], Last[knots]},
  Filling -> Axis, PlotRange -> Full, PlotTheme -> "Scientific"]
```



```
In[22]:= test = Table[{t -> i/30}, {i, 0, 30}]
```

Out[22]=

$$\left\{ \left\{ t \rightarrow 0 \right\}, \left\{ t \rightarrow \frac{1}{30} \right\}, \left\{ t \rightarrow \frac{1}{15} \right\}, \left\{ t \rightarrow \frac{1}{10} \right\}, \left\{ t \rightarrow \frac{2}{15} \right\}, \left\{ t \rightarrow \frac{1}{6} \right\}, \left\{ t \rightarrow \frac{1}{5} \right\}, \left\{ t \rightarrow \frac{7}{30} \right\}, \right.$$

$$\left. \left\{ t \rightarrow \frac{4}{15} \right\}, \left\{ t \rightarrow \frac{3}{10} \right\}, \left\{ t \rightarrow \frac{1}{3} \right\}, \left\{ t \rightarrow \frac{11}{30} \right\}, \left\{ t \rightarrow \frac{2}{5} \right\}, \left\{ t \rightarrow \frac{13}{30} \right\}, \left\{ t \rightarrow \frac{7}{15} \right\}, \left\{ t \rightarrow \frac{1}{2} \right\}, \right.$$

$$\left. \left\{ t \rightarrow \frac{8}{15} \right\}, \left\{ t \rightarrow \frac{17}{30} \right\}, \left\{ t \rightarrow \frac{3}{5} \right\}, \left\{ t \rightarrow \frac{19}{30} \right\}, \left\{ t \rightarrow \frac{2}{3} \right\}, \left\{ t \rightarrow \frac{7}{10} \right\}, \left\{ t \rightarrow \frac{11}{15} \right\}, \right.$$

$$\left. \left\{ t \rightarrow \frac{23}{30} \right\}, \left\{ t \rightarrow \frac{4}{5} \right\}, \left\{ t \rightarrow \frac{5}{6} \right\}, \left\{ t \rightarrow \frac{13}{15} \right\}, \left\{ t \rightarrow \frac{9}{10} \right\}, \left\{ t \rightarrow \frac{14}{15} \right\}, \left\{ t \rightarrow \frac{29}{30} \right\}, \left\{ t \rightarrow 1 \right\} \right\}$$

```
In[39]:= A = B2 /. test;
```

```
In[41]:= s = B1 /. test;
```

```
In[43]:= M = LinearSolve[A, s] // MatrixForm
```

Out[43]/MatrixForm=

$$\begin{pmatrix} 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & \frac{1}{6} & \frac{5}{6} & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & \frac{1}{2} & \frac{1}{2} & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & \frac{5}{6} & \frac{1}{6} & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 \end{pmatrix}$$