```
restart;
EQ := A[i]·x[i-2] + B[i]·x[i-1] + C[i]·x[i] + D[i]·x[i+1] + E[i]·x[i+2] - F[i] = 0
```

$$A_i x_{i-2} + B_i x_{i-1} + C_i x_i + \mathrm{D}_i x_{i+1} + E_i x_{i+2} - F_i = 0 \tag{1}$$

```
x(i) := alpha[i]·x[i+1] + beta[i]·x[i+2] + gamma[i];
```

$$i \to \alpha_i x_{i+1} + \beta_i x_{i+2} + \gamma_i \tag{2}$$

```
EQ1 := subs(x[i-2] = x(i-2), EQ)
```

$$A_i \left(\alpha_{i-2} x_{i-1} + \beta_{i-2} x_i + \gamma_{i-2}\right) + B_i x_{i-1} + C_i x_i + \mathrm{D}_i x_{i+1} + E_i x_{i+2} - F_i = 0 \tag{3}$$

```
EQ2 := subs(x[i-1] = x(i-1), EQ1)
```

$$A_i \left(\alpha_{i-2} \left(\alpha_{i-1} x_i + \beta_{i-1} x_{i+1} + \gamma_{i-1}\right) + \beta_{i-2} x_i + \gamma_{i-2}\right) + B_i \left(\alpha_{i-1} x_i + \beta_{i-1} x_{i+1} + \gamma_{i-1}\right) + C_i x_i + \mathrm{D}_i x_{i+1} + E_i x_{i+2} - F_i = 0 \tag{4}$$

```
EQ3 := subs(x[i] = x(i), EQ2)
```

$$A_i \left(\alpha_{i-2} \left(\alpha_{i-1} \left(\alpha_i x_{i+1} + \beta_i x_{i+2} + \gamma_i\right) + \beta_{i-1} x_{i+1} + \gamma_{i-1}\right) + \beta_{i-2} \left(\alpha_i x_{i+1} + \beta_i x_{i+2} + \gamma_i\right) + \gamma_{i-2}\right) + B_i \left(\alpha_{i-1} \left(\alpha_i x_{i+1} + \beta_i x_{i+2} + \gamma_i\right) + \beta_{i-1} x_{i+1} + \gamma_{i-1}\right) + C_i \left(\alpha_i x_{i+1} + \beta_i x_{i+2} + \gamma_i\right) + \mathrm{D}_i x_{i+1} + E_i x_{i+2} - F_i = 0 \tag{5}$$

```
EQ4 := collect(EQ3, [x[i+2], x[i+1]], factor)
```

$$\left(A_i \alpha_{i-2} \alpha_{i-1} \beta_i + A_i \beta_i \beta_{i-2} + B_i \alpha_{i-1} \beta_i + C_i \beta_i + E_i\right) x_{i+2} + \left(A_i \alpha_i \alpha_{i-2} \alpha_{i-1} + A_i \alpha_i \beta_{i-2} + A_i \alpha_{i-2} \beta_{i-1} + B_i \alpha_i \alpha_{i-1} + B_i \beta_{i-1} + C_i \alpha_i + \mathrm{D}_i\right) x_{i+1} + A_i \alpha_{i-2} \alpha_{i-1} \gamma_i + A_i \alpha_{i-2} \gamma_{i-1} + A_i \beta_{i-2} \gamma_i + B_i \alpha_{i-1} \gamma_i + A_i \gamma_{i-2} + B_i \gamma_{i-1} + C_i \gamma_i - F_i = 0 \tag{6}$$

```
first := coeff(lhs(EQ4), x[i+2]) = 0
```

$$A_i \alpha_{i-2} \alpha_{i-1} \beta_i + A_i \beta_i \beta_{i-2} + B_i \alpha_{i-1} \beta_i + C_i \beta_i + E_i = 0 \tag{7}$$

```
second := coeff(lhs(EQ4), x[i+1]) = 0
```

$$A_i \alpha_i \alpha_{i-2} \alpha_{i-1} + A_i \alpha_i \beta_{i-2} + A_i \alpha_{i-2} \beta_{i-1} + B_i \alpha_i \alpha_{i-1} + B_i \beta_{i-1} + C_i \alpha_i + \mathrm{D}_i = 0 \tag{8}$$

```
third := coeff(coeff(lhs(EQ4), x[i+2], 0), x[i+1], 0) = 0;
```

$$A_i \alpha_{i-2} \alpha_{i-1} \gamma_i + A_i \alpha_{i-2} \gamma_{i-1} + A_i \beta_{i-2} \gamma_i + B_i \alpha_{i-1} \gamma_i + A_i \gamma_{i-2} + B_i \gamma_{i-1} + C_i \gamma_i - F_i = 0 \tag{9}$$

```
solve([first, second, third], [alpha[i], beta[i], gamma[i]])
```

$$\left[\left[\alpha_i = -\frac{A_i \alpha_{i-2} \beta_{i-1} + B_i \beta_{i-1} + \mathrm{D}_i}{A_i \alpha_{i-2} \alpha_{i-1} + A_i \beta_{i-2} + B_i \alpha_{i-1} + C_i}, \beta_i = -\frac{E_i}{A_i \alpha_{i-2} \alpha_{i-1} + A_i \beta_{i-2} + B_i \alpha_{i-1} + C_i}, \gamma_i = -\frac{A_i \alpha_{i-2} \gamma_{i-1} + A_i \gamma_{i-2} + B_i \gamma_{i-1} - F_i}{A_i \alpha_{i-2} \alpha_{i-1} + A_i \beta_{i-2} + B_i \alpha_{i-1} + C_i}\right]\right] \tag{10}$$