```
> restart;
> # IRK method by collocation
> with(LinearAlgebra):
> c:=Vector([1/4,1/2,3/4]);
```

$$c := \begin{bmatrix} \frac{1}{4} \\ \frac{1}{2} \\ \frac{3}{4} \end{bmatrix}$$

```
> nu:=Dimension(c);
```

$$\nu := 3$$

```
> q:=1:
  for i from 1 to nu do
      q:=q*(t-c[i]);
  od:
> qi:=(n,tau)->unapply(q/(t-c[n]),t)(tau);
```

$$qi := (n, tau) \rightarrow unapply\left(\frac{q}{t - c_n}, t \right)(\tau)$$

```
> A:=Matrix(3,3):
> for i from 1 to nu do
     for j from 1 to nu do
        A[j,i]:=int(qi(i,tau)/qi(i,c[i]),tau=0..c[j]);
     od:
  od:
> b:=Vector(3):
> for j from 1 to nu do
     b[j]:=int(qi(j,tau)/qi(j,c[j]),tau=0..1);
  od:
> A;
```

$$\begin{bmatrix} \frac{23}{48} & \frac{-1}{3} & \frac{5}{48} \\ \frac{7}{12} & \frac{-1}{6} & \frac{1}{12} \\ \frac{9}{16} & 0 & \frac{3}{16} \end{bmatrix}$$

```
> b;
```

$$\begin{bmatrix} \frac{2}{3} \\ \frac{-1}{3} \\ \frac{2}{3} \end{bmatrix}$$

```
> for j from 0 to nu do
    if int(q*t^j,t=0..1) <> 0 then
       break;
    fi
  od;
  m:=j;
```

$$m := 1$$

```
> #The order of this method is
  m+nu;
```

$$4$$