T05. Parametric Interpolation

1) Use the parametric formulation of the Lagrange polynomial to fit a 2D and 3D polynomial curve to the set of nodes:

$$(0,0,0),(1,0,1/3),(0,1,2/3)$$

Add the node $(1,1,1)$ and fit a Lagrane polynomial of higher degree.

2) Draw a Hermite curve through the data

P	0	1/2	1
Q	1	1/3	1
v_p	1	0	0
v_q	1	1	1

Repeat the problem but using a Hermite curve with tension.

3) Draw a Hermite curve through the data

P	0	0	0
Q	1	1	1
v_p	1	0	0
v_q	1	1	1
a_p	0	1	0
a_q	1	2	1

4) Draw a Natural Spline Curve to the following set of points in 2D and 3D.

x	0	1	1	0
y	0	0	1	1
z	0	1/3	2/3	1

5) Using the same data as in Prob. 4, draw a Relaxed Spline Curve to the set of points in 2D and 3D.

6) Draw a Cyclic Spline Curve to the following set of points in 2D and 3D.

x	0	1	1	0	0.2
y	0	0	1	1	0.4
z	0	1/3	2/3	1	1/2

7) Fit a 2D Periodic Spline Curve to a table of the function $y = \sin x$ in the interval $[0,4\pi]$

8) Draw a Closed Spline Curve to the following set of points in 2D and 3D

x	0	1	1	0	-1
y	1	1	0	1	1
z	0	1/3	2/3	1	1/2

9) Fit a Cardinal Spline to the Curve $y(x) = \sin(x) + 3\cos(2x)$ in the interval $[0,2\pi]$

10) Compare the Newton interpolating polynomial with 5 and 19 nodes with the 2D spline curves with the same nodes to interpolate the function

$$f(x) = \frac{1}{1+x^2}$$

within the interval $x \in [-5, 5]$