Zestaw 7 1N

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Skonstruowano splajn dla danych zawartych w pliku dane.txt.

```
XY = Import["D:\\Uczelnia\FIZYKA\II ROK\I Semestr\Met_Num\Zestaw7\dane.dat"];

SplajnNat[XY0_] := Module[{XY = XY0},

  Dd = Module[{k}, n = Length[XY] - 1; X = Transpose[XY][[1]];
    Y = Transpose[XY][[2]]; h = d = Table[0, {n}]; m = Table[0, {n + 1}];
    a = b = c = v = Table[0, {n - 1}]; s = Table[0, {n}, {4}];
    h[[1]] = X[[2]] - X[[1]];
    d[[1]] = (Y[[2]] - Y[[1]]) / h[[1]];
    For[k = 2, k ≤ n, k++,
      h[[k]] = X[[k+1]] - X[[k]];
      d[[k]] = (Y[[k+1]] - Y[[k]]) / h[[k]];
      a[[k-1]] = h[[k]];
      b[[k-1]] = 2 (h[[k-1]] + h[[k]]);
      c[[k-1]] = h[[k]];
      v[[k-1]] = 6 (d[[k]] - d[[k-1]])]; ];

  TrD := Module[{k, t},
    m[[1]] = 0;
    m[[n+1]] = 0;
    For[k = 2, k ≤ n - 1, k++,
      t = a[[k-1]] / b[[k-1]];
      b[[k]] = b[[k]] - t c[[k-1]];
      v[[k]] = v[[k]] - t v[[k-1]]; ];
    m[[n]] = v[[n-1]] / b[[n-1]];
    For[k = n - 2, 1 ≤ k, k--,
      m[[k+1]] = (v[[k]] - c[[k]] m[[k+2]]) / b[[k]]; ]; ];

  Pol := Module[{k},
    For[k = 1, k ≤ n, k++,
      s[[k,1]] = Y[[k]];
      s[[k,2]] = d[[k]] - 1/6 h[[k]] (2 m[[k]] + m[[k+1]]);
      s[[k,3]] = m[[k]] / 2;
```
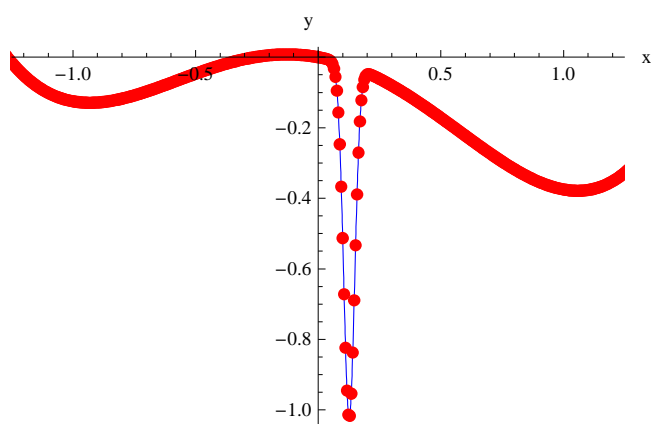
$$s_{[\![k,4]\!]} = \frac{m_{[\![k+1]\!]} - m_{[\![k]\!]}}{6\,h_{[\![k]\!]}};\Big];\Big];$$

```mathematica
CS[t_] := Module[{j},
    For[ j = 1, j ≤ n, j++,
      If[ X[[j]] ≤ t && t < X[[j+1]], k = j ]; ];
    If[t < X[[1]], k = 1 ];
    If[X[[n+1]] ≤ t, k = n ];
    w = t - X[[k]];
    Return[ ((s[[k,4]] w + s[[k,3]]) w + s[[k,2]]) w + s[[k,1]] ]; ];


    Dd;
    TrD;
    Pol; ]
```

In[3]:=
```mathematica
SplajnNat[XY];
dots = ListPlot[XY, PlotStyle → {Red, PointSize[0.02]}, DisplayFunction → Identity];
gr = Plot[CS[x], {x, -1.2, 1.2}, PlotStyle → {Blue}, DisplayFunction → Identity];
Show[gr, dots, AxesLabel → {"x", "y    "}]
Print["Splajn y = ", Expand[CS[x]]];
```

Out[6]=

Splajn y $= -0.538579 + 1.65361\,x - 2.70231\,x^2 + 1.21179\,x^3$