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## Zestaw 7 1N

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Skonstruowano splajn dla danych zawartych w pliku dane.txt.

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In[1]:= 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]] =  $\frac{Y[[2]] - Y[[1]]}{h[[1]]}$ ;
    For[k = 2, k ≤ n, k++,
      h[[k]] = X[[k + 1]] - X[[k]];
      d[[k]] =  $\frac{Y[[k + 1]] - Y[[k]]}{h[[k]]}$ ;
      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 =  $\frac{a[[k - 1]]}{b[[k - 1]]}$ ;
      b[[k]] = b[[k]] - t c[[k - 1]];
      v[[k]] = v[[k]] - t v[[k - 1]]];
    m[[n]] =  $\frac{v[[n - 1]]}{b[[n - 1]]}$ ;
    For[k = n - 2, 1 ≤ k, k--,
      m[[k + 1]] =  $\frac{v[[k]] - c[[k]] m[[k + 2]]}{b[[k]]}$ ];
  Pol := Module[{k},
    For[k = 1, k ≤ n, k++,
      s[[k, 1]] = Y[[k]];
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$$s_{[k,2]} = d_{[k]} - \frac{1}{6} h_{[k]} (2 m_{[k]} + m_{[k+1]});$$


$$s_{[k,3]} = \frac{m_{[k]}}{2};$$


$$s_{[k,4]} = \frac{m_{[k+1]} - m_{[k]}}{6 h_{[k]}}; ] ; ] ;$$

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; ]

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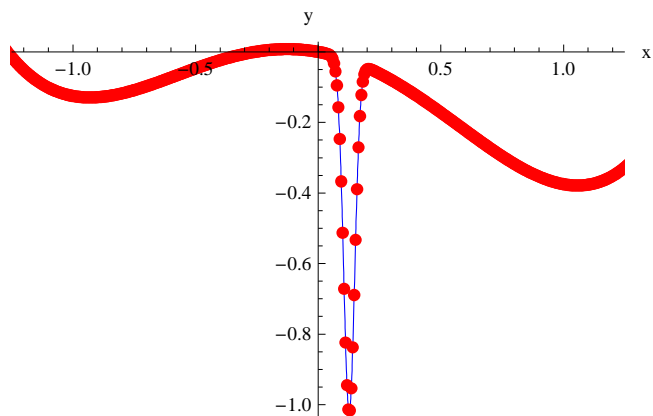
In[3]:=

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In[4]:= 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[7]=



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