Zestaw 4 poprawa

Katarzyna Sowa

3N

Zbudowano wielomian interpolacyjny oparty na nastepujacych danych:

In[1]:=
```
x0 = -1.2300;
y0 = 1.5129;
x1 = -1.1900;
y1 = 1.4161;
x2 = -0.7400;
y2 = 0.5476;
x3 = 0.1100;
y3 = 0.0121;
x4 = 2.5600;
y4 = 6.5536;
```

In[11]:=
$$p[t\_] := N\Big[y_0 \frac{(t - x_1)(t - x_2)(t - x_3)(t - x_4)}{(x_0 - x_1)(x_0 - x_2)(x_0 - x_3)(x_0 - x_4)} + y_1 \frac{(t - x_0)(t - x_2)(t - x_3)(t - x_4)}{(x_1 - x_0)(x_1 - x_2)(x_1 - x_3)(x_1 - x_4)} + y_2 \frac{(t - x_0)(t - x_1)(t - x_3)}{(x_2 - x_0)(x_2 - x_1)(x_2 - x_3)(x_2 - x_4)} + y_3 \frac{(t - x_0)(t - x_1)(t - x_2)(t - x_4)}{(x_3 - x_0)(x_3 - x_1)(x_3 - x_2)(x_3 - x_4)} + y_4 \frac{(t - x_0)(t - x_1)(t - x_2)(t - x_3)}{(x_4 - x_0)(x_4 - x_1)(x_4 - x_2)(x_4 - x_3)}\Big];$$

In[12]:=
```
p[t]
```

Out[12]=
$$15.1988(-2.56+t)(-0.11+t)(0.74+t)(1.19+t) - 16.1379(-2.56+t)(-0.11+t)(0.74+t)(1.23+t) + 0.885364(-0.11+t)(1.19+t)(1.23+t) - 0.00333543(-2.56+t)(0.74+t)(1.19+t)(1.23+t) + 0.0570334(-0.11+t)(0.74+t)(1.19+t)(1.23+t)$$

In[13]:=
```
Expand[p[t]]
```

Out[13]=
$$-0.507477 + 3.91695\,t + 7.22066\,t^2 + 1.10671\,t^3 - 0.885364\,t^4$$

5N

Skonstruowano funckje, jak w zadaniu 4N:

In[14]:=
$$f[x\_] := \frac{1}{1 + 5\,x^2};$$

In[15]:=
$$X = \text{Table}\Big[x, \Big\{x, -1, 1, \frac{1}{32}\Big\}\Big];$$

In[16]:=
```
Y = Map[f, X];
```

In[17]:=
```
XY = N[Transpose[Distribute[{X, Y}]]];
```

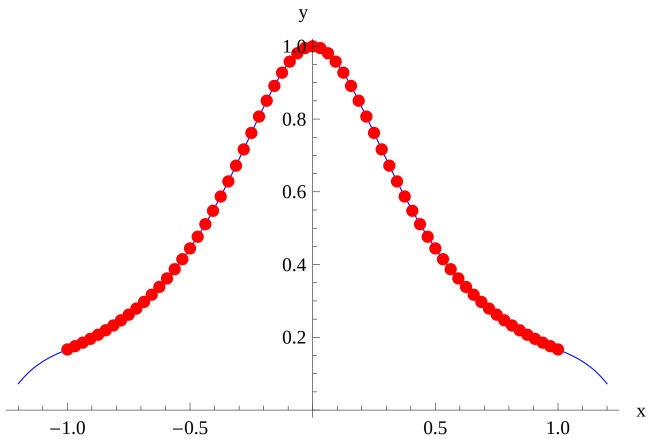
In[18]:=

```
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]] = (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; ]
```

In[19]:=
```
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[22]=



Splajn y = $5.15425 - 14.3955\, x + 14.1119\, x^2 - 4.70397\, x^3$