

Bogdan Chwaliæski

Zestaw 4 Zadanie 7

In[129]:=

$$f[x_] := \frac{1}{1 + 5 x^2};$$

In[130]:=

$$X = \text{Table}\left[x, \left\{x, -1, 1, \frac{1}{32}\right\}\right];$$

In[123]:=

$$Y = \text{Map}[f, X]$$

$$\begin{aligned} \text{In[131]:= } & \left\{ \frac{1}{6}, \frac{1024}{5829}, \frac{256}{1381}, \frac{1024}{5229}, \frac{64}{309}, \frac{1024}{4669}, \frac{256}{1101}, \frac{1024}{4149}, \frac{16}{61}, \frac{1024}{3669}, \frac{256}{861}, \frac{1024}{3229}, \frac{64}{189}, \right. \\ & \frac{1024}{2829}, \frac{256}{661}, \frac{1024}{2469}, \frac{4}{9}, \frac{1024}{2149}, \frac{256}{501}, \frac{1024}{1869}, \frac{64}{109}, \frac{1024}{1629}, \frac{256}{381}, \frac{1024}{1429}, \frac{16}{21}, \frac{1024}{1269}, \\ & \frac{256}{301}, \frac{1024}{1149}, \frac{64}{69}, \frac{1024}{1069}, \frac{256}{261}, \frac{1024}{1029}, 1, \frac{1024}{1029}, \frac{256}{261}, \frac{1024}{1069}, \frac{64}{69}, \frac{1024}{1149}, \frac{256}{301}, \\ & \frac{1024}{1269}, \frac{16}{21}, \frac{1024}{1429}, \frac{256}{381}, \frac{1024}{1629}, \frac{64}{109}, \frac{1024}{1869}, \frac{256}{501}, \frac{1024}{2149}, \frac{9}{9}, \frac{2469}{2469}, \frac{661}{661}, \frac{1024}{2829}, \\ & \left. \frac{64}{189}, \frac{1024}{3229}, \frac{256}{861}, \frac{1024}{3669}, \frac{16}{61}, \frac{1024}{4149}, \frac{256}{1101}, \frac{1024}{4669}, \frac{256}{309}, \frac{1024}{5229}, \frac{1024}{1381}, \frac{64}{5829}, \frac{1}{6} \right\} \\ \text{Out[131]:= } & \left\{ \frac{1}{6}, \frac{1024}{5829}, \frac{256}{1381}, \frac{1024}{5229}, \frac{64}{309}, \frac{1024}{4669}, \frac{256}{1101}, \frac{1024}{4149}, \frac{16}{61}, \frac{1024}{3669}, \frac{256}{861}, \frac{1024}{3229}, \frac{64}{189}, \right. \\ & \frac{1024}{2829}, \frac{256}{661}, \frac{1024}{2469}, \frac{4}{9}, \frac{1024}{2149}, \frac{256}{501}, \frac{1024}{1869}, \frac{64}{109}, \frac{1024}{1629}, \frac{256}{381}, \frac{1024}{1429}, \frac{16}{21}, \frac{1024}{1269}, \\ & \frac{256}{301}, \frac{1024}{1149}, \frac{64}{69}, \frac{1024}{1069}, \frac{256}{261}, \frac{1024}{1029}, 1, \frac{1024}{1029}, \frac{256}{261}, \frac{1024}{1069}, \frac{64}{69}, \frac{1024}{1149}, \frac{256}{301}, \\ & \frac{1024}{1269}, \frac{16}{21}, \frac{1024}{1429}, \frac{256}{381}, \frac{1024}{1629}, \frac{64}{109}, \frac{1024}{1869}, \frac{256}{501}, \frac{1024}{2149}, \frac{9}{9}, \frac{2469}{2469}, \frac{661}{661}, \frac{1024}{2829}, \\ & \left. \frac{64}{189}, \frac{1024}{3229}, \frac{256}{861}, \frac{1024}{3669}, \frac{16}{61}, \frac{1024}{4149}, \frac{256}{1101}, \frac{1024}{4669}, \frac{256}{309}, \frac{1024}{5229}, \frac{1024}{1381}, \frac{64}{5829}, \frac{1}{6} \right\} \end{aligned}$$

In[132]:= XY = Transpose[Distribute[{X, Y}]];

In[133]:=

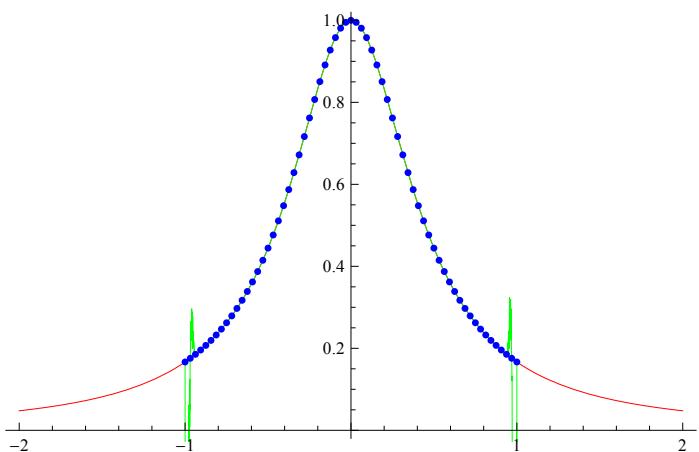
$$\begin{aligned} \text{MetodaLagrangea[XY_]:=Module[} & \\ & \{j, k, n, X, Y\}, \\ & X_k := \text{Transpose}[XY]_{[1, k+1]}; \\ & Y_k := \text{Transpose}[XY]_{[2, k+1]}; \\ & n = \text{Length}[XY] - 1; \\ & \text{Return}\left[ \sum_{k=0}^n Y_k \left( \prod_{j=0}^{k-1} \frac{x - X_j}{X_k - X_j} \right) \left( \prod_{j=k+1}^n \frac{x - X_j}{X_k - X_j} \right) \right]; \\ \text{]} & \end{aligned}$$

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In[134]:= For[n = 2, n <= 15, n++,
  x1 = -1;
  x2 = 1;
  XY = N[
    Table[{x1 + (x2 - x1)/n k, f[x1 + (x2 - x1)/n k]}, {k, 0, n}]
  ];
  Cdot = ListPlot[XY, PlotStyle -> {Blue, PointSize[0.01]}];
  P[x_] = MetodaLagrangea[XY];
  graph1 = Plot[f[x], {x, -2, 2}, PlotStyle -> Red];
  graph2 = Plot[P[x], {x, -1, 1}, PlotStyle -> Green];
  WyswietlWykres = Show[graph1, graph2, Cdot]
];
WyswietlWykres

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Out[135]=

**Z wykresu:****kolor niebieski - wezły i wartości funkcji****kolor zielony - wykres wielomianu****kolor czerwony - wykres funkcji**