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(*)
Scrietii un program care sa ne realizeze
interpolarea Hermite pentru o functie data.
*)

(*)
f[x] = Sin[Pi x] , pe acelasi interval [-2,2]
!!!! probleme in 0 !!!!!
*)

X = {-2, -1, 0, 1, 2};

f[x_] := Sin[Pi x];

For[i = 1, i <= Length[X], i++,
  Y[i] = f[X[[i]]];
  V[i] = f'[X[[i]]];
]

n = Length[X];

For[i = 1, i ≤ n, i++,
  a = 1;
  For[j = 1, j ≤ n, j++,
    If[j ≠ i, a = a *  $\frac{x - X[[j]]}{X[[i]] - X[[j]]}$ ]];
  L[i, x_] = a]

For[i = 1, i ≤ n, i++,
  H[i, x_] = Simplify[(1 - 2 D[L[i, x], x] (x - X[[i]])) L[i, x]^2];
  Hb[i, x_] = Simplify[(x - X[[i]]) L[i, x]^2];
]

L[x_] = Simplify[ $\sum_{i=1}^n (Y[i] L[i, x])$ ];

PA = Graphics[{Red, PointSize[Large], Point[{X[[1]], Y[1]}]}];
PB = Graphics[{Red, PointSize[Large], Point[{X[[2]], Y[2]}]}];
PC = Graphics[{Red, PointSize[Large], Point[{X[[3]], Y[3]}]}];
PD = Graphics[{Red, PointSize[Large], Point[{X[[4]], Y[4]}]}];
PE = Graphics[{Red, PointSize[Large], Point[{X[[5]], Y[5]}]}];

Lg = Plot[L[x], {x, -2, 2}, PlotStyle → {Thickness[0.01], Red}];

H[x_] = Simplify[ $\sum_{i=1}^n (Y[i] H[i, x] + V[i] Hb[i, x])$ ];

f'[X[[n]]]

π

H'[X[[n]]]

π

curba = Plot[f[x], {x, -2, 2}, PlotStyle → Black];

Hg = Plot[H[x], {x, -2, 2}, PlotStyle → {Thickness[0.01], Orange}];

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r = 20;
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Show[Hg, Lg, curba, PA, PB, PC, PD, PE]
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