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Wybrane metody modelowania matematycznego

Projekt 1

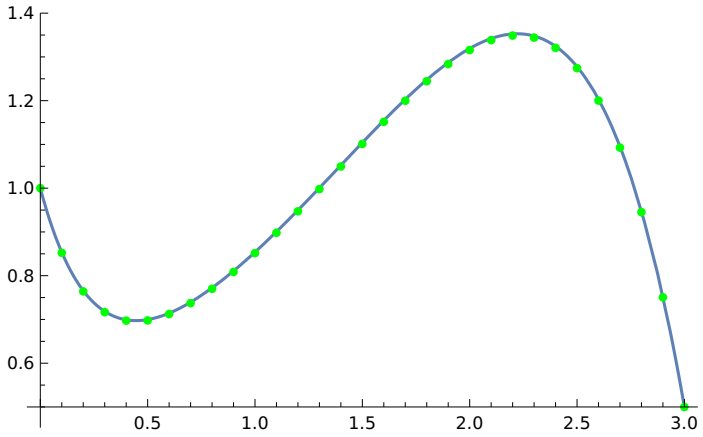
In[689]:=

```
rrr2[function_, P_, Q_, pointA_, pointB_, Ya_, Yb_, number_] :=
 Module[{f = function, p = P, q = Q, a = pointA, b = pointB, ya = Ya, yb = Yb, n = number},

roz = DSolve[{y''[x] + p * y'[x] + q * y[x] == f[x], y[a] == ya, y[b] == yb}, y[x], x][[1, 1, 2]];
h = (b - a) / (n - 1);
xi = Table[a + i * h, {i, 1, n - 2}];
w1 = 2 - p * h;
w2 = 2 * (q * h * h - 2);
w3 = 2 + p * h;
w4 = Table[2 * h * h * f[x], {x, a, b, h}];
tableB = {w4[[2]] - ya * w1};
For[i = 3, i ≤ n - 2, i++,
AppendTo[tableB, w4[[i]];
];
AppendTo[tableB, w4[[n - 1]] - yb * w3];

matrix = Table[Table[0, {i, 1, n - 2}], {i, n - 2}];
For[i = 1, i ≤ n - 2, i++,
For[j = 1, j ≤ n - 2, j++,
If[i == j + 1, matrix[[i, j]] = w1];
If[i == j, matrix[[i, j]] = w2];
If[i == j - 1, matrix[[i, j]] = w3];
];
];
solution = LinearSolve[matrix, tableB];
points = Transpose[{xi, solution}];
AppendTo[points, {a, ya}];
AppendTo[points, {b, yb}];
points = SortBy[points, First];
Return[{roz, points}]
]
```

In[690]:=

```
f[x_] := x - Exp[x]
p = 3;
q = -4;
a = 0;
b = 3;
ya = 1;
yb = 0.5;
n = 31;
roz = rrr2[f, p, q, a, b, ya, yb, n];
Show[Plot[roz[[1]], {x, a, b}], ListPlot[roz[[2]], PlotStyle → Green]]
```

Out[699]=

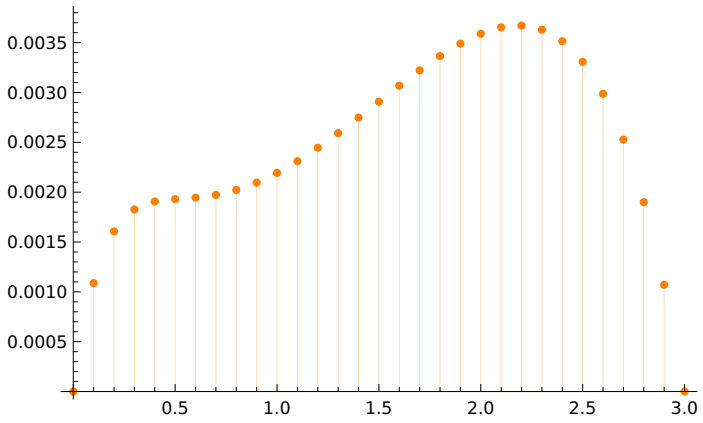


In[658]:=

In[720]:=

```
ListX = Transpose[roz[[2]]][[1]];
ListY = Transpose[roz[[2]]][[2]];
resultPoints = Table[roz[[1]] /. {x → ListX[[i]]}, {i, 1, Length[ListX]}];
bar = ListPlot[Transpose[{ListX, Abs[ListY - resultPoints]}],
  PlotStyle → Orange, Filling → Axis]
```

Out[723]=



In[719]:=