Příklad číslo 2

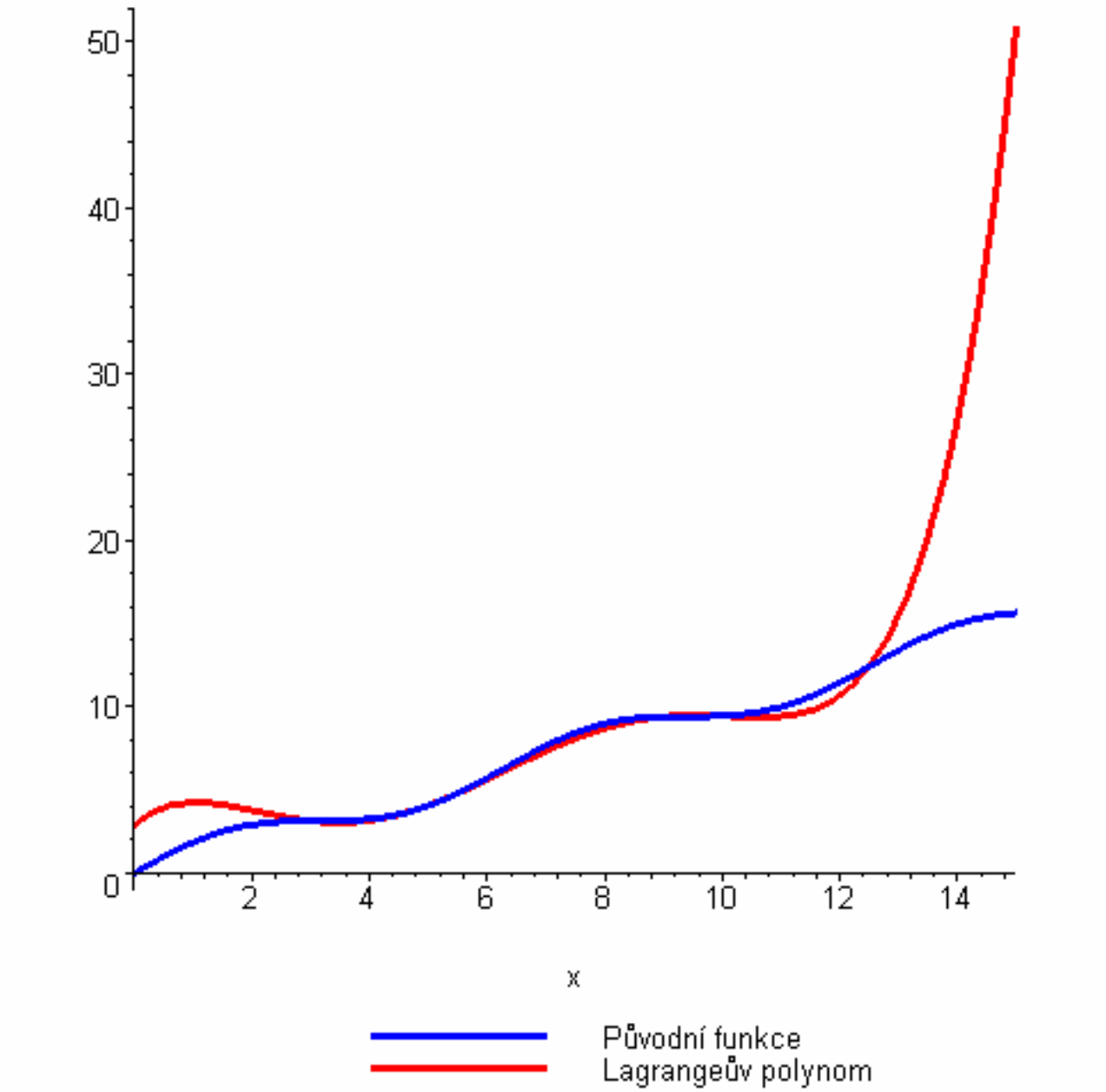
```
> with(CurveFitting):
>
P:=PolynomialInterpolation([9,3,4.5,10,5.5,12.5],[9+sin(9),3+sin(
3),4.5+sin(4.5),10+sin(10),5.5+sin(5.5),12.5+sin(12.5)],x,form=La
grange);
```

$$P := 0.003023431595\,(9+\sin(9))\,(x-3)\,(x-4.5)\,(x-10)\,(x-5.5)\,(x-12.5)$$
$$-0.0006683375104\,(3+\sin(3))\,(x-9)\,(x-4.5)\,(x-10)\,(x-5.5)\,(x-12.5)$$
$$+0.01186016795\,(x-9)\,(x-3)\,(x-10)\,(x-5.5)\,(x-12.5)$$
$$-0.002308802309\,(10+\sin(10))\,(x-9)\,(x-3)\,(x-4.5)\,(x-5.5)\,(x-12.5)$$
$$-0.01739486503\,(x-9)\,(x-3)\,(x-4.5)\,(x-10)\,(x-12.5)$$
$$+0.002671037186\,(x-9)\,(x-3)\,(x-4.5)\,(x-10)\,(x-5.5)$$

```
> expand(evalf(P));
```

$$3.09117021\,x - 2.21991775\,x^2 + 0.545203518\,x^3 - 0.0513743551\,x^4$$
$$+0.00166192229\,x^5 + 2.88384950$$

```
>
plot([x+sin(x),P],x=0..15,color=[blue,red],thickness=3,legend=["P
ůvodní funkce","Lagrangeův polynom"]);
```



Příklad číslo 3 - pomocné výpočty

```
> with(linalg):
>
A:=linalg[matrix](4,4,[1,1,1,1,1024,256,64,16,5,4,3,2,1280,256,48
,8]);
```

$$A := \begin{bmatrix} 1 & 1 & 1 & 1 \\ 1024 & 256 & 64 & 16 \\ 5 & 4 & 3 & 2 \\ 1280 & 256 & 48 & 8 \end{bmatrix}$$

```
> B:=inverse(A);
```

$$B := \begin{bmatrix} \frac{-4}{27} & \frac{-7}{864} & \frac{1}{9} & \frac{1}{144} \\ \frac{13}{9} & \frac{1}{18} & -1 & \frac{-1}{24} \\ \frac{-40}{9} & \frac{-25}{288} & \frac{8}{3} & \frac{1}{16} \\ \frac{112}{27} & \frac{17}{432} & \frac{-16}{9} & \frac{-1}{36} \end{bmatrix}$$

```
> a:=linalg[matrix](4,1,[2,-5,-2,1]);
```

$$a := \begin{bmatrix} 2 \\ -5 \\ -2 \\ 1 \end{bmatrix}$$

```
> linalg[multiply](B,a);
```

$$\begin{bmatrix} \frac{-407}{864} \\ \frac{329}{72} \\ \frac{-3953}{288} \\ \frac{5023}{432} \end{bmatrix}$$

Příklad číslo 4 - pomocné výpočty

```
>
C:=linalg[matrix](6,6,[1,1,0,0,0,0,0,0,1,1,1,1,0,0,27,9,3,1,3,1,-
3,-2,-1,0,6,0,-6,-2,0,0,0,0,18,2,0,0]);
```

$$C := \begin{bmatrix} 1 & 1 & 0 & 0 & 0 & 0 \\ 0 & 0 & 1 & 1 & 1 & 1 \\ 0 & 0 & 27 & 9 & 3 & 1 \\ 3 & 1 & -3 & -2 & -1 & 0 \\ 6 & 0 & -6 & -2 & 0 & 0 \\ 0 & 0 & 18 & 2 & 0 & 0 \end{bmatrix}$$

```
> c:=linalg[matrix](6,1,[-1/2,1/2,1/10,0,0,0]);
```

$$c := \begin{bmatrix} \frac{-1}{2} \\ \frac{1}{2} \\ \frac{1}{10} \\ 0 \\ 0 \\ 0 \end{bmatrix}$$

```
> C1:=inverse(C);
```

$$C1 := \begin{bmatrix} \frac{-1}{6} & \frac{-1}{12} & \frac{1}{12} & \frac{1}{6} & \frac{1}{9} & \frac{-1}{18} \\ \frac{7}{6} & \frac{1}{12} & \frac{-1}{12} & \frac{-1}{6} & \frac{-1}{9} & \frac{1}{18} \\ \frac{1}{12} & \frac{1}{24} & \frac{-1}{24} & \frac{-1}{12} & \frac{1}{36} & \frac{1}{9} \\ \frac{-3}{4} & \frac{-3}{8} & \frac{3}{8} & \frac{3}{4} & \frac{-1}{4} & \frac{-1}{2} \\ \frac{23}{12} & \frac{11}{24} & \frac{-11}{24} & \frac{-23}{12} & \frac{23}{36} & \frac{5}{9} \\ \frac{-5}{4} & \frac{7}{8} & \frac{1}{8} & \frac{5}{4} & \frac{-5}{12} & \frac{-1}{6} \end{bmatrix}$$

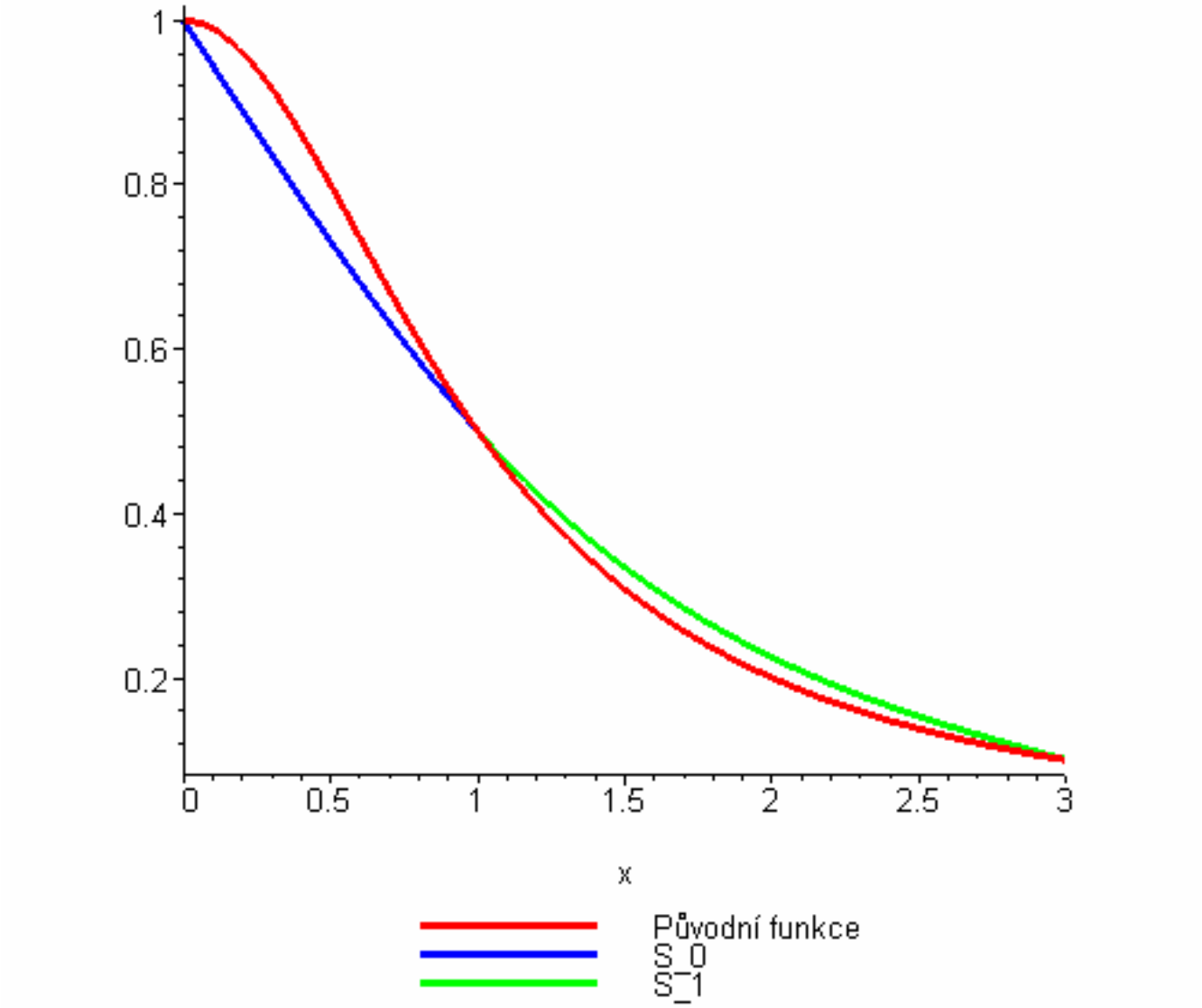
```
> linalg[multiply](C1,c);
```

$$\begin{bmatrix} \frac{1}{20} \\ \frac{-11}{20} \\ \frac{-1}{40} \\ \frac{9}{40} \\ \frac{-31}{40} \\ \frac{43}{40} \end{bmatrix}$$

Na příslušném intervalu:

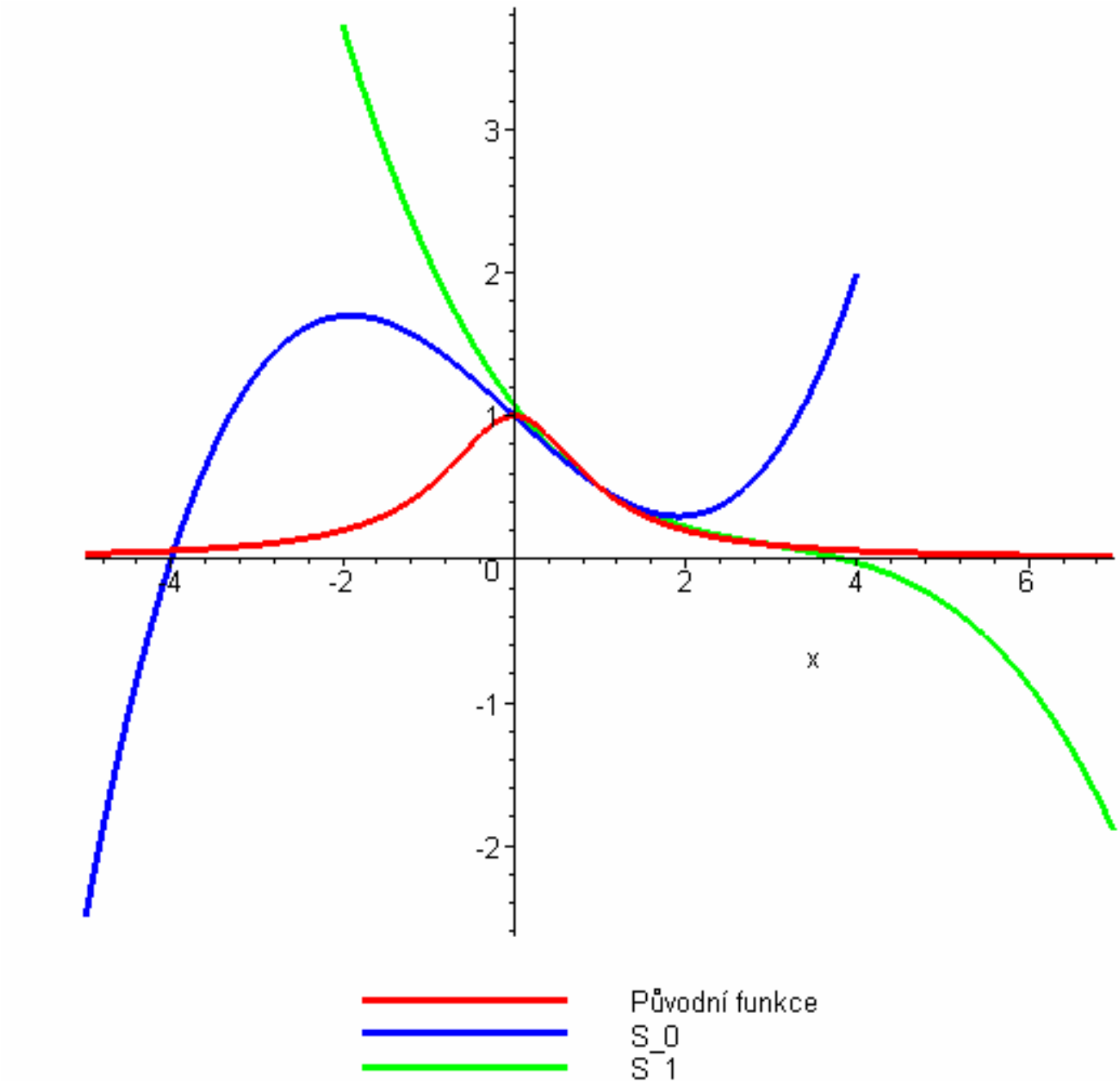
```
> with(plots):
>
multiple(plot,[1/(1+x^2),x=0..3,color=red,thickness=3,legend="Původní funkce"],[1-
```

```
11/20*x+1/20*x^3,x=0..1,color=blue,thickness=3,legend="S_0"],[43/
40-31/40*x+9/40*x^2-
1/40*x^3,x=1..3,color=green,thickness=3,legend="S_1"]);
```



Mimo něj:

```
> multiple(plot,[1/(1+x^2),x=-
5..7,color=red,thickness=3,legend="Původní funkce"],[1-
11/20*x+1/20*x^3,x=-
5..4,color=blue,thickness=3,legend="S_0"],[43/40-
31/40*x+9/40*x^2-1/40*x^3,x=-
2..7,color=green,thickness=3,legend="S_1"]);
```


3
2
1
-1
-2
-4
-2
0
2
4
6
x
Původní funkce
S_0
S_1

>