

Samodejno odvajanje

Andrej Borštnik, Barbara Bajcer

Fakulteta za matematiko in fiziko

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1 Samodejno odvajanje

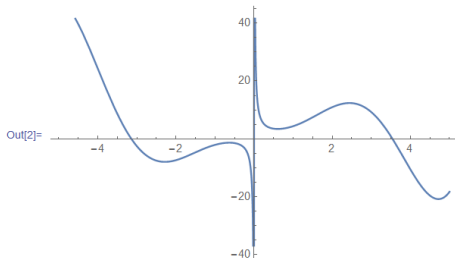
1 Samodejno odvajanje

2 Levi in desni odvodi

- 1 Samodejno odvajanje
- 2 Levi in desni odvodi
- 3 Lipschitzove konstante

```
In[1]:= f[x_] := Exp[x] / x + 2 x^2 Sin[x];
```

```
In[2]:= Plot[f[x], {x, -5, 5}]
```



```
In[3]:= Table[N[D[f[x], {x, k}] /. x -> 1, 17], {k, 0, 14}]
```

```
Out[3]= {4.4012237980748382, 4.4464885509678655, 8.7236422450199560, -10.131192415931451,
-2.6926621035325515, -123.30646837902937, 782.11725700134034, -5018.9509084565035,
40210.422879416369, -362926.18094394889, 3.6289716219290460 × 106, -3.9916719028555494 × 107,
4.7900135379519123 × 108, -6.2270209235552409 × 109, 8.7178291535039949 × 1010}
```

```
(*
```

```
Haskell]:
```

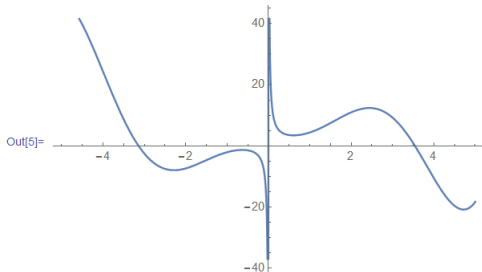
```
f (idD 1);
```

```
4.401223798074838, 4.4464885509678655, 8.723642245019956, -10.131192415931453,
-2.692662103532559, -123.30646837902931, 782.1172570013406, -5018.950908456501,
40210.42287941638, -362926.1809439487, 3628971.6219290467, -3.991671902855549e7,
4.7900135379519105e8, -6.227020923555244e9, 8.71782915350399e10, ...
```

```
*)
```

```
In[4]:= f[x_] := Exp[x] / x + 2 x^2 Sin[x];
```

```
In[5]:= Plot[f[x], {x, -5, 5}]
```



```
In[7]:= Table[N[D[f[x], {x, k}] /. x -> 0.01, 17], {k, 0, 14}]
```

```
Out[7]= {101.005, -9999.5, 2. × 106, -6. × 108, 2.4 × 1011, -1.2 × 1014, 7.2 × 1016, -5.04 × 1019, 4.032 × 1022,  
-3.6288 × 1025, 3.6288 × 1028, -3.99168 × 1031, 4.79002 × 1034, -6.22702 × 1037, 8.71783 × 1040}
```

```
(*
```

```
Haskell:
```

```
f (idD 0.01);
```

```
101.00501870838346,-9999.496054149928,2000000.4558366945,-5.999999877499917e8,  
2.39999999998017e11,-1.200000000003981e14,7.2e16,-5.03999999999999e19,  
4.032000000000001e22,-3.628799999999995e25,3.6288e28,-3.991679999999992e31,  
4.790015999999998e34,-6.227020799999999e37,8.71782912e40, ...
```

```
*)
```



```
g(x) = x^2  
g (idD 4)  
16.0, 8.0, 2.0, 0
```



```
g(x) = x^2
```

```
g (idD 4)
```

```
16.0, 8.0, 2.0, 0
```

```
h(x) = x^6
```

```
h (idD 1)
```

```
1.0, 6.0, 30.0, 120.0, 360.0, 720.0, 720.0, 0
```

```
g(x) = x^2
```

```
g (idD 4)
```

```
16.0, 8.0, 2.0, 0
```

```
h(x) = x^6
```

```
h (idD 1)
```

```
1.0, 6.0, 30.0, 120.0, 360.0, 720.0, 720.0, 0
```

```
k(x) = sin(x^2)
```

```
k (idD 1)
```

```
0.8414709848078965, 1.0806046117362795, -2.2852793274953065,  
-14.420070264639875, -22.568626742439122, 87.08875465286715,  
746.5137961465103, 2028.9913034612805, -4355.06268259366,  
-69627.83387598622, -308672.6345339131, Interrupted.
```

```
g(x) = x^2
```

```
g (idD 4)
```

```
16.0, 8.0, 2.0, 0
```

```
h(x) = x^6
```

```
h (idD 1)
```

```
1.0, 6.0, 30.0, 120.0, 360.0, 720.0, 720.0, 0
```

```
k(x) = sin(x^2)
```

```
k (idD 1)
```

```
0.8414709848078965, 1.0806046117362795, -2.2852793274953065,  
-14.420070264639875, -22.568626742439122, 87.08875465286715,  
746.5137961465103, 2028.9913034612805, -4355.06268259366,  
-69627.83387598622, -308672.6345339131, Interrupted.
```

Kjer funkcija ni odvedljiva, dobimo čudne stvari:

$$g(x) = x^2$$

$$g \text{ (idD 4)}$$

$$16.0, 8.0, 2.0, 0$$

$$h(x) = x^6$$

$$h \text{ (idD 1)}$$

$$1.0, 6.0, 30.0, 120.0, 360.0, 720.0, 720.0, 0$$

$$k(x) = \sin(x^2)$$

$$k \text{ (idD 1)}$$

$$0.8414709848078965, 1.0806046117362795, -2.2852793274953065, \\ -14.420070264639875, -22.568626742439122, 87.08875465286715, \\ 746.5137961465103, 2028.9913034612805, -4355.06268259366, \\ -69627.83387598622, -308672.6345339131, \text{ Interrupted.}$$

Kjer funkcija ni odvedljiva, dobimo čudne stvari:

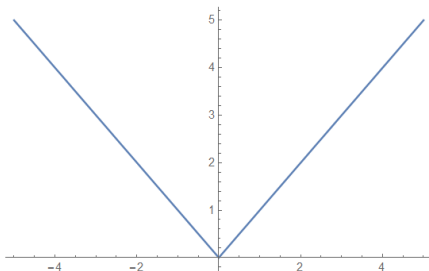
$$f \text{ (idD 0)}$$

$$\text{Infinity, NaN, NaN, NaN, NaN, NaN, NaN, NaN, NaN, NaN, NaN, NaN, NaN, NaN, NaN, NaN, ...}$$

```
In[8]:= g[x_] := Abs[x];
```

```
In[9]:= Plot[g[x], {x, -5, 5}]
```

Out[9]=



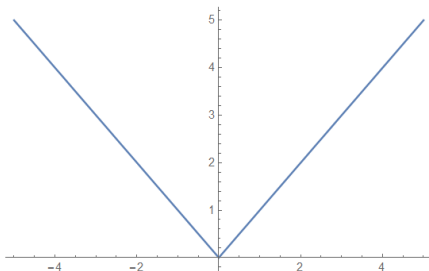
```
In[10]:= Table[N[D[g[x], {x, k}] /. x -> 0, 17], {k, 0, 14}]
```

```
Out[10]= {0, Abs'[0], Abs''[0], Abs(3)[0], Abs(4)[0], Abs(5)[0], Abs(6)[0], Abs(7)[0],  
Abs(8)[0], Abs(9)[0], Abs(10)[0], Abs(11)[0], Abs(12)[0], Abs(13)[0], Abs(14)[0]}
```

```
In[8]:= g[x_] := Abs[x];
```

```
In[9]:= Plot[g[x], {x, -5, 5}]
```

Out[9]=



```
In[10]:= Table[N[D[g[x], {x, k}] /. x -> 0, 17], {k, 0, 14}]
```

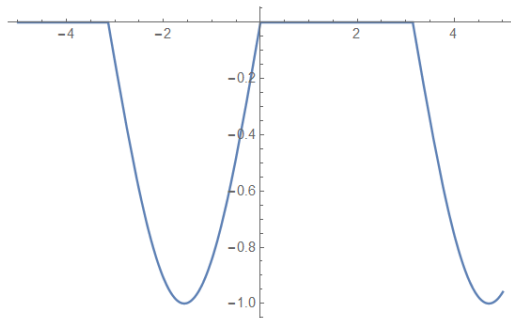
```
Out[10]= {0, Abs'[0], Abs''[0], Abs(3)[0], Abs(4)[0], Abs(5)[0], Abs(6)[0], Abs(7)[0],  
Abs(8)[0], Abs(9)[0], Abs(10)[0], Abs(11)[0], Abs(12)[0], Abs(13)[0], Abs(14)[0]}
```

Haskell:

```
g (idD 0)
```

```
D 0.0 -1.0 1.0
```

```
In[11]:= h[x_] := Min[Sin[x], 0];  
Plot[h[x], {x, -5, 5}]
```

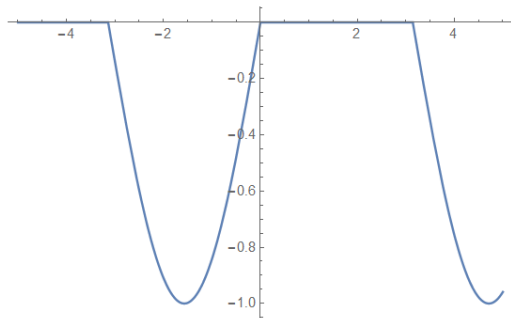


Out[12]=

```
In[13]:= D[h[x], x]
```

```
Out[13]= { Cos[x] Sin[x] < 0  
          { 0      True
```

```
In[11]:= h[x_] := Min[Sin[x], 0];
Plot[h[x], {x, -5, 5}]
```



Out[12]=

```
In[13]:= D[h[x], x]
```

```
Out[13]= { Cos[x] Sin[x] < 0
           0 True }
```

Haskell:

```
h (idD 0)
```

```
D 0.0 1.0 0.0
```