

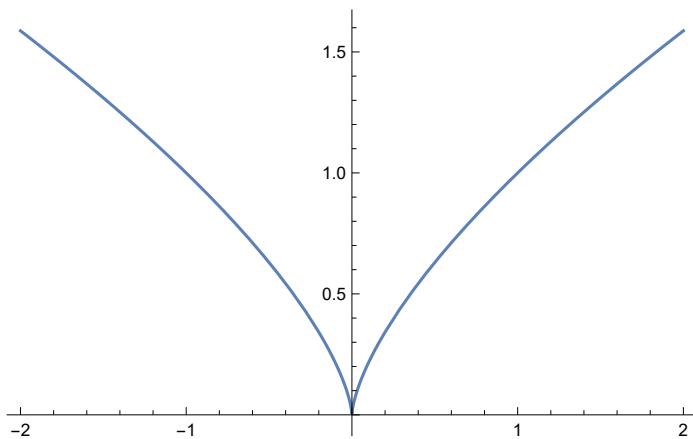
Vježbe 3. Konveksne i kvazikonveksne funkcije

Primjeri

Kvazikonveksna funkcija koja nije konveksna :

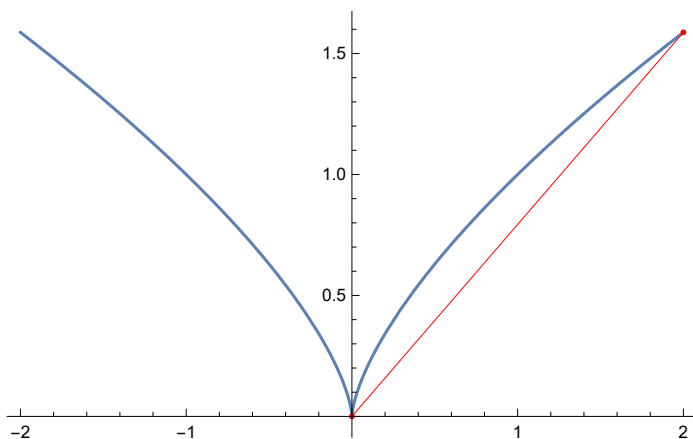
```
In[34]:= f[x_] := (x^2)^(1/3)  
Plot[f[x], {x, -2, 2}]
```

Out[35]=



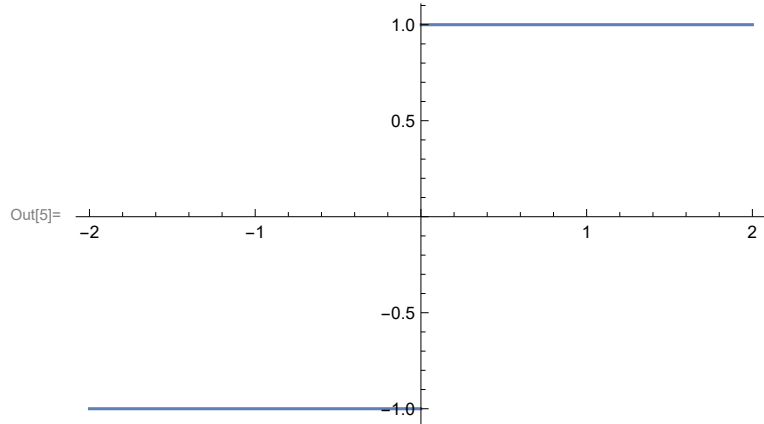
```
In[37]:= Show[Plot[f[x], {x, -2, 2}],  
Graphics[{Red, Point[{{0, f[0]}, {2, f[2]}]}, Line[{{0, f[0]}, {2, f[2]}]}]]
```

Out[37]=



Kvazikonveksna funkcija ne mora biti neprekidna :

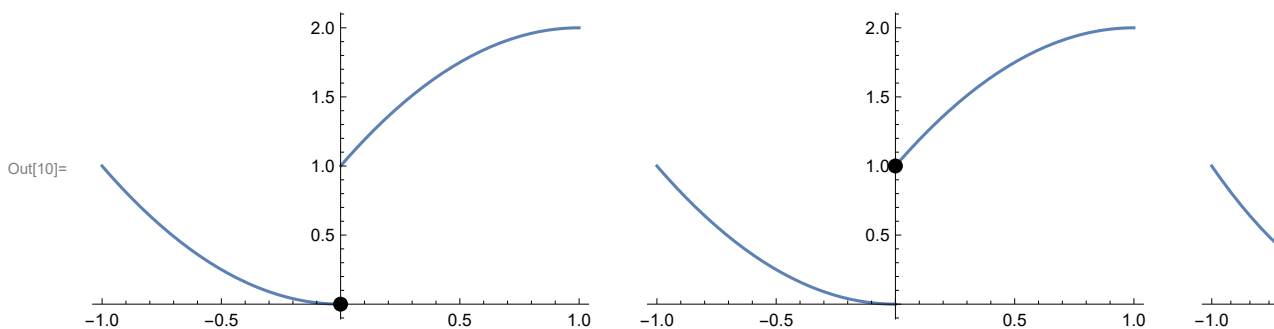
```
In[5]:= Plot[Sign[x], {x, -2, 2}]
```



Primjer 2.1 - kvazikonveksne funkcije

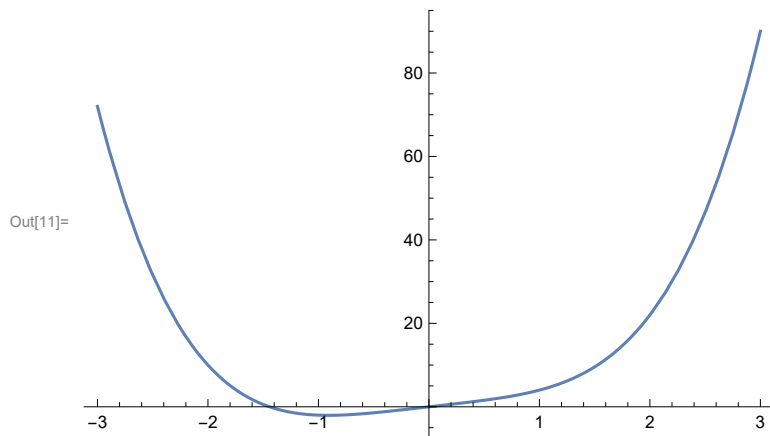
```
In[6]:= f1[x_] := Piecewise[{{x^2, -1 ≤ x ≤ 0}, {2 - (x - 1)^2, 0 < x ≤ 1}}]
f2[x_] := Piecewise[{{x^2, -1 ≤ x < 0}, {2 - (x - 1)^2, 0 ≤ x ≤ 1}}]
f3[x_] := Piecewise[{{x^2, -1 ≤ x ≤ 0}, {2 - (x - 1)^2, 0 < x ≤ 1.5}}]
f4[x_] :=
  Piecewise[{{x^2 + 1, -1 ≤ x ≤ 0}, {1, 0 < x ≤ 1}, {2 - (x - 2)^2, 1 < x ≤ 2}}]
```

```
In[10]:= GraphicsRow[
  {Show[Plot[f1[x], {x, -1, 1}], Graphics[{{PointSize[0.03], Point[{0, 0}]}]},
  Show[Plot[f2[x], {x, -1, 1}], Graphics[{{PointSize[0.03], Point[{0, 1}]}]},
  Show[Plot[f3[x], {x, -1, 1.5}], Graphics[{{PointSize[0.03], Point[{0, 1}]}]},
  Plot[f4[x], {x, -1, 2}, AxesOrigin → {0, 0}]}]
```

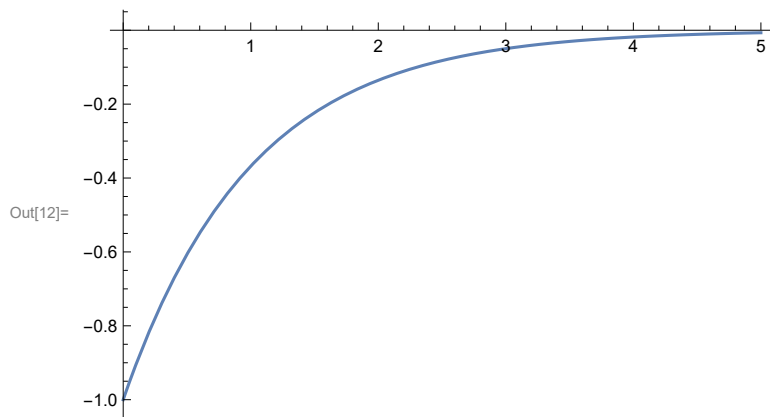


Zadatak

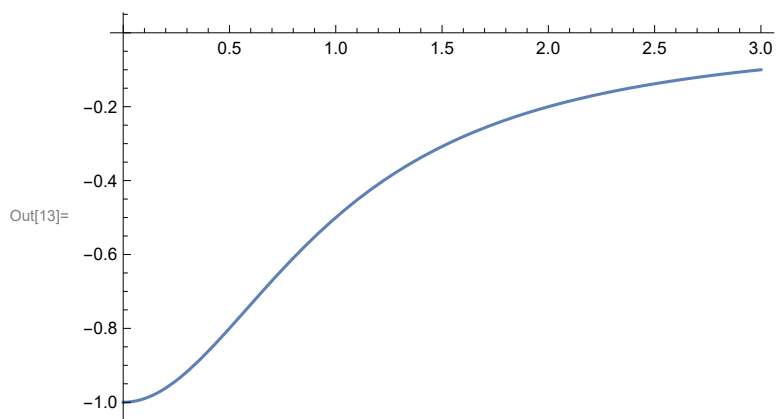
```
In[11]:= Plot[x^4 + 3 x, {x, -3, 3}]
```



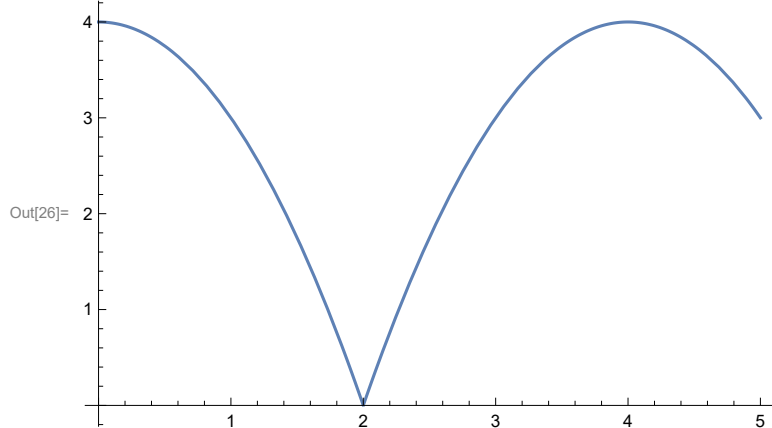
```
In[12]:= Plot[-Exp[-x], {x, 0, 5}]
```



```
In[13]:= Plot[-1 / (x^2 + 1), {x, 0, 3}, AxesOrigin -> {0, 0}]
```



```
In[26]:= Plot[Piecewise[{{4 - x^2, 0 ≤ x ≤ 2}, {4 - (x - 4)^2, 1 < x ≤ 5}},  
{x, 0, 5}, AxesOrigin → {0, 0}]
```



Zadatak

```
In[29]:= f[x_] := 1 / (Exp[1 / x^2] + 1)
```

```
In[30]:= f'[x]
```

Out[30]=

$$\frac{2 e^{\frac{1}{x^2}}}{\left(1 + e^{\frac{1}{x^2}}\right)^2 x^3}$$

```
In[31]:= Plot[f[x], {x, 0, 1}]  
Plot[f[x], {x, -1, 0}]  
Plot[f[x], {x, -1, 1}]
```

