In[∘]:= (*dadeno e uravnenieto $\frac{x^2-2x+5}{(x+1)\,(x-2)}-2=0$*)

(*1) da se nameri broqt na vsichki koreni i da se lokalizira nay-golemiq i nay-malkiq*)

(*2) napravete 2 iteracii po metoda na nyuton*)

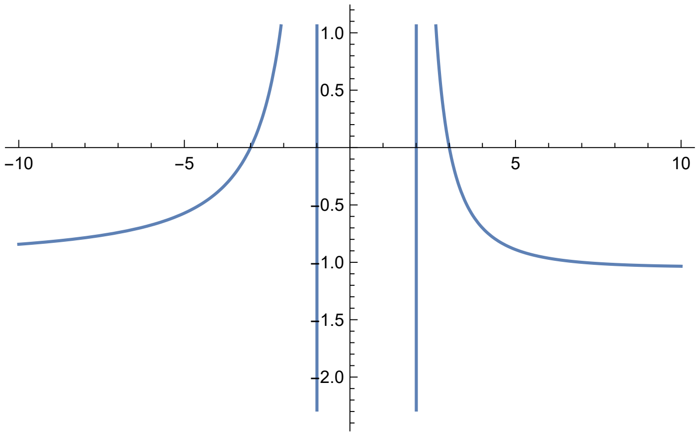
(*3) kakva e tochnostta na poslednata iteraciq*)

(*4) da se nameri lokaliziraniq ot 1) koren s tochnost 10^-14*)

$$f[x\_] := \frac{x^2 - 2\,x + 5}{(x + 1)\;(x - 2)} - 2;$$

```
Plot[f[x], {x, -10, 10}]
```

Out[∘]=

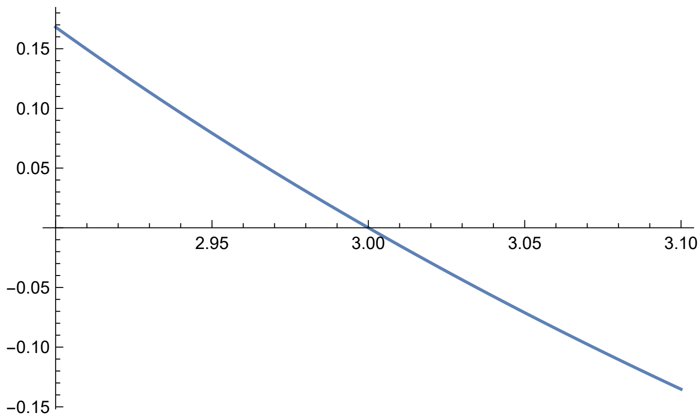


(*uravnenieto ima dva korena*)

(*lokalizirane na golemiq koren*)

In[∘]:=
```
Plot[f[x], {x, 2.9, 3.1}]
```

Out[∘]=



In[∘]:= `f[2.9]`

Out[∘]= 0.168091

In[∘]:= `f[3.1]`

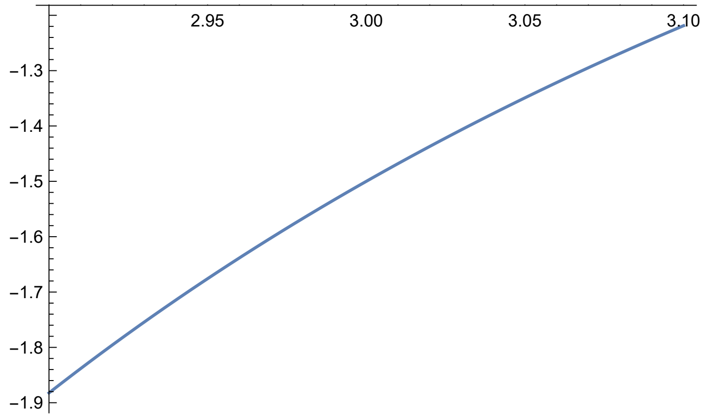
Out[∘]= -0.135255

In[∘]:= `f[2.9] × f[3.1]`

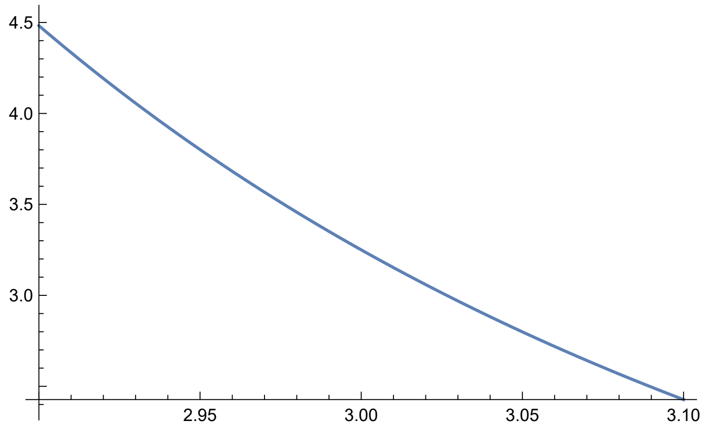
Out[∘]= -0.0227352

(*v izbraniq interval [2.9;3.1] ima koren*)

In[ ]:=
```
Plot[f'[x], {x, 2.9, 3.1}]
```

Out[ ]=


In[ ]:=
```
Plot[f''[x], {x, 2.9, 3.1}]
```

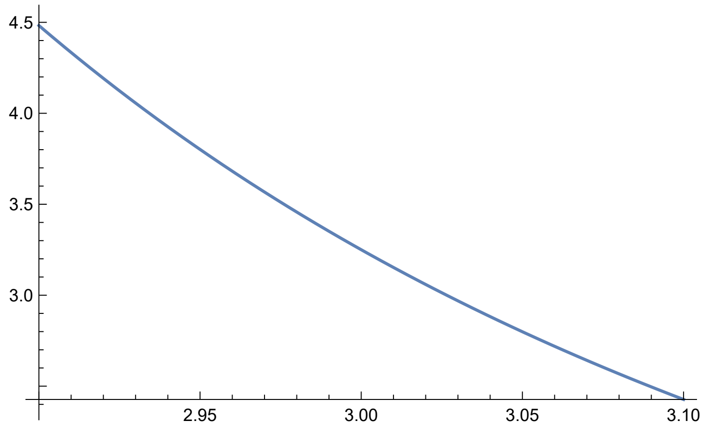
Out[ ]=



```
(*purvata proizvodna ima samo otricatelni stoynosti v intervala [2.9;
  3.1]*)
(*vtorata proizvodna ima samo polojitelni stoynosti v intervala [2.9;
  3.1]*)
```

```
(*opredelqma nachalnoto priblijenie
 (tuk nqma nujda da opredelqme postoqnna tochka)*)
(*tuy kato vtorata proizvodna e
  polojitelna izbirame tursim takova x0 che f(x0) > 0*)
```

```
x0 = f[2.9];
Plot[Abs[f''[x]], {x, 2.9, 3.1}]
```

Out[ ]=



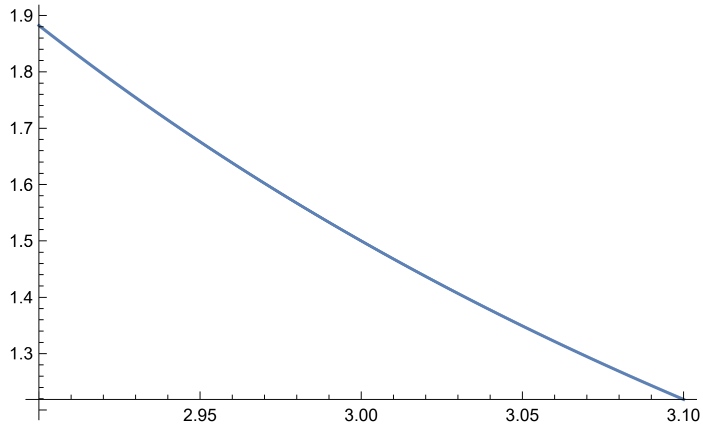

```
(*absolutnata stoynost na vtorata proizvodna
 dostiga svoq maksimum v leviq kray na intervala *)
```

In[ ]:= `M2 = Abs[f''[2.9]]`

Out[ ]= 4.48256

In[ ]:= `Plot[Abs[f'[x]], {x, 2.9, 3.1}]`

Out[ ]=




```
(*absolutnata stoynost na purvata proizvodna
 dostiga svoq minimum v desniq kray na intervala *)
```

In[ ]:= `m1 = Abs[f'[3.1]]`

Out[ ]= 1.21877

In[ ]:= $K = \frac{M2}{2\,m1}$

Out[ ]= 1.83896

```
(*zapochvame s iteraciite*)
```

```
x0 = 2.9;
f[x0]
f'[x0]
(*nuleva iteraciq*)
x1 = x0 - f[x0]/f'[x0]
```

Out[•]= 0.168091

Out[•]= -1.88229

Out[•]= 2.9893

In[•]:= $2.9 - \frac{0.16809}{-1.882289}$

Out[•]= 2.9893

```
In[•]:= f[x1]
f'[x1]
```

Out[•]= 0.0162359

Out[•]= -1.53535

In[•]:= eps1 = K Abs[x1 - x0]^2

Out[•]= 0.0146653

```
In[•]:= (*vtora iteraciq*)
x = x0;
Print["n=0", " x=", x, " f(x)=", f[x], " f'[x]=", f'[x]];
For[n = 1, n ≤ 10, n++,
 xnew = x - f[x]/f'[x];
 epsn = K (xnew - x)^2;
 x = xnew;

 Print["n=", n, " x=", x, " f(x)=", f[x], " f'[x]=", f'[x], " eps=", epsn]
]
```

n=0 x=2.9 f(x)=0.168091 f'[x]=-1.88229

n=1 x=2.9893 f(x)=0.0162359 f'[x]=-1.53535 eps=0.0146653

n=2 x=2.99988 f(x)=0.000185767 f'[x]=-1.5004 eps=0.000205643

n=3 x=3. f(x)=2.49165×10^{-8} f'[x]=-1.5 eps=2.81901×10^{-8}

n=4 x=3. f(x)=8.88178×10^{-16} f'[x]=-1.5 eps=5.07415×10^{-16}

n=5 x=3. f(x)=0. f'[x]=-1.5 eps=3.62672×10^{-31}

n=6 x=3. f(x)=0. f'[x]=-1.5 eps=0.

n=7 x=3. f(x)=0. f'[x]=-1.5 eps=0.

n=8 x=3. f(x)=0. f'[x]=-1.5 eps=0.

n=9 x=3. f(x)=0. f'[x]=-1.5 eps=0.

n=10 x=3. f(x)=0. f'[x]=-1.5 eps=0.