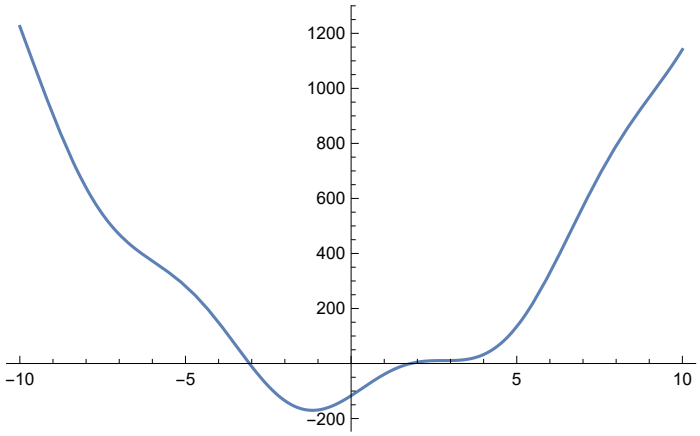
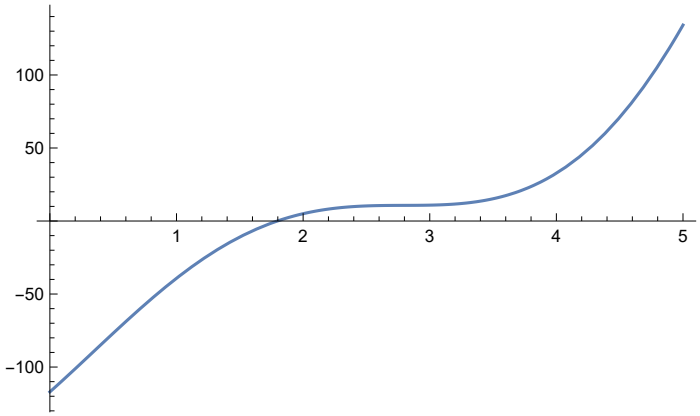
In[ ]:=
```
f[x_] := 13 x^2 + 77 Sin[x] - 117;
Plot[f[x], {x, -10, 10}]
```

Out[ ]=



In[ ]:=
```
Plot[f[x], {x, 0, 5}]
```

Out[ ]=

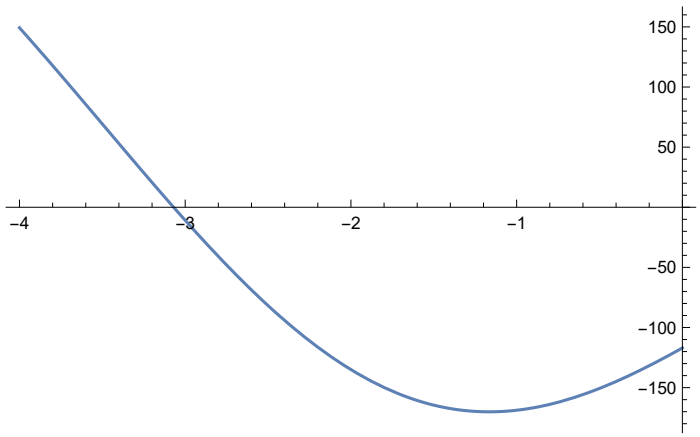



```
(*broqt na korenite sa dva*)

(*lokalizirame nay-malkiq koren*)
```

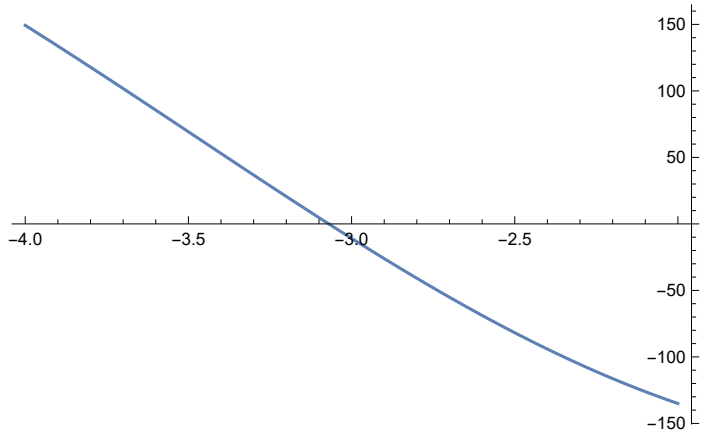
In[ ]:=
```
Plot[f[x], {x, -4, 0}]
```

Out[ ]=



In[•]:=
```
Plot[f[x], {x, -4, -2}]
```

Out[•]=



In[•]:=
```
f[-4.]
```

Out[•]= 149.274

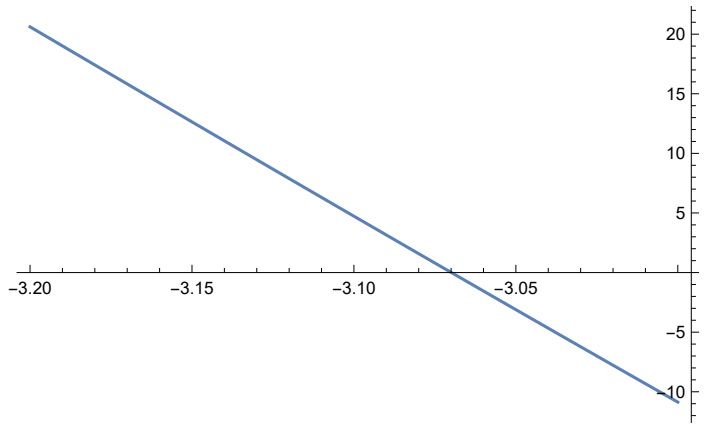
In[•]:=
```
f[-2.]
```

Out[•]= −135.016

```
(*kraishtata na intervala znacite sa razlichni
  f[-4.] = 149.274
   f[-2.] = -135.016
        sledva che funkciqta ima pone edin koren
*)
```

In[•]:=
```
Plot[f[x], {x, -3.2, -3}]
```

Out[•]=



In[•]:=
```
f[-3.2]
```

Out[•]= 20.6148

In[•]:=
```
f[-3.]
```

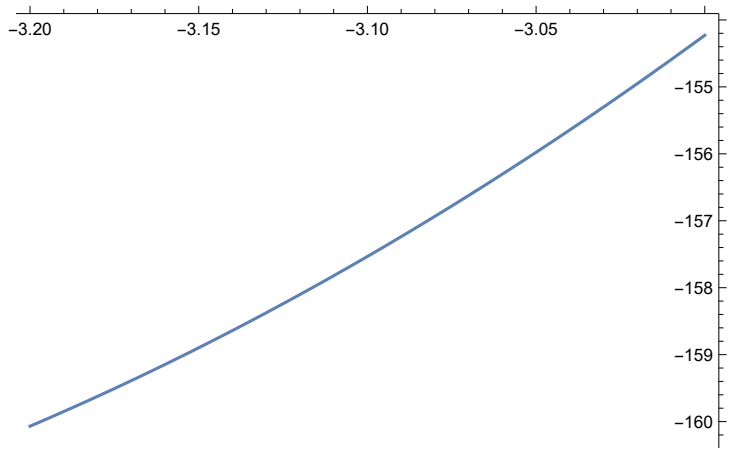
Out[•]= −10.8662

```
(*kraishtata na intervala znacite sa razlichni
  f[-3.2] = 20.614809043923685`
   f[-3.] = -10.866240620609773`
        sledva che funkciqta ima pone edin koren
*)
```

```
(*proverka na usloviqta na metoda:*)
```

In[ ]:=
```
Plot[f'[x], {x, -3.2, -3}]
```

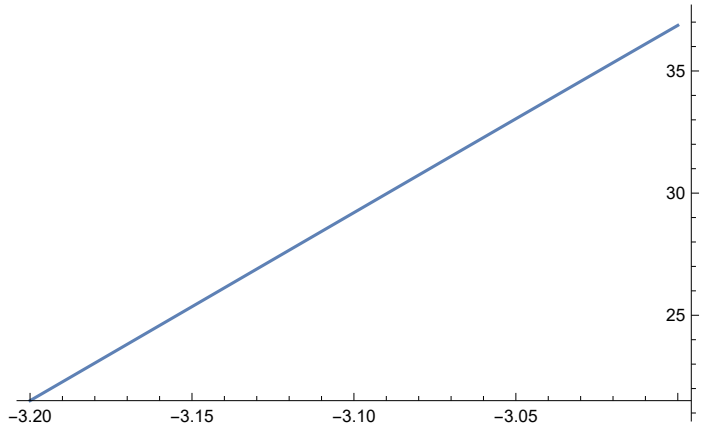
Out[ ]=




```
(*izvod: purvata proizvodna f'(x) v intervala [-3.2;
    -3] ima stoynosti mejdu -160 do -154*)
(*sledovatelno f'(x)<
 0 v razglejdaniq interval otgovarq na uslovieto che e s postoqnen znak*)
```

In[ ]:=
```
Plot[f''[x], {x, -3.2, -3}]
```

Out[ ]=




```
(*izvod: purvata proizvodna f'(x) v intervala [-3.2;
   -3] ima stoynosti mejdu 20 do 40*)

(*izbor na nachalno priblijenie i na postoqnna tochka f(x0).f''<0 *)
(*otgovarq na uslovieto che e s postoqnen znak*)
(*tochka na priblijenie izbirame kydeto e otricatelnata chast*)
(*postoqnnata tochka q izbirame da e drugiq kray*)
```

In[ ]:=
```
x0 = -3.;
p = -3.2;
```

In[ ]:=
```
f[x0]
```

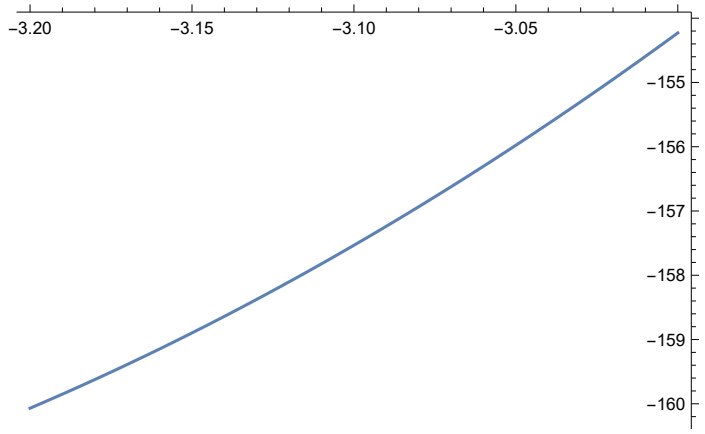
Out[ ]=
```
-10.8662
```

In[ ]:=
```
f[p]
```

Out[ ]=
```
20.6148
```

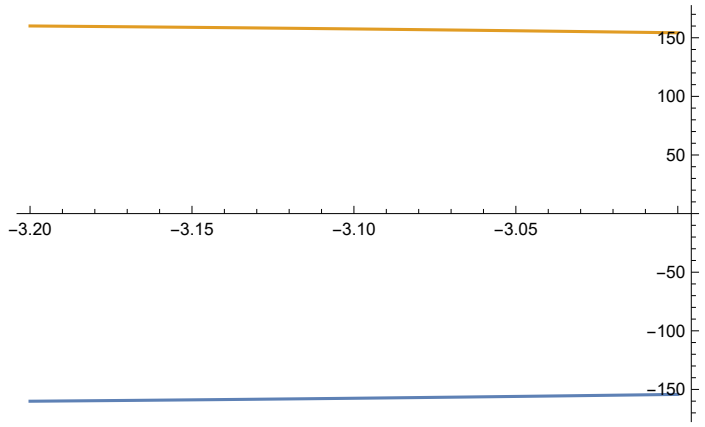
In[ ]:=
```
Plot[f'[x], {x, -3.2, -3}]
```

Out[ ]=



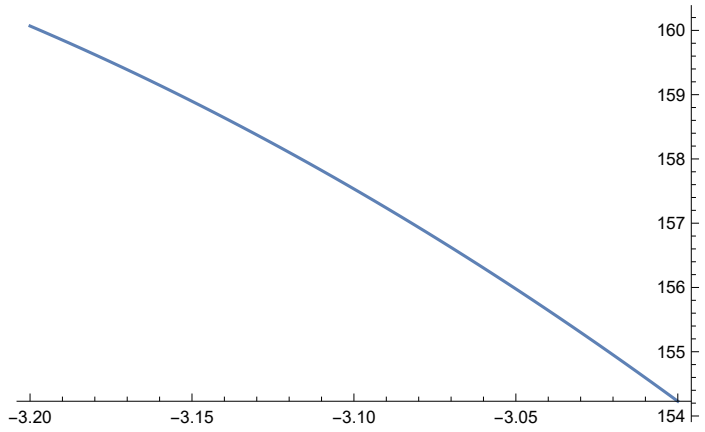
In[ ]:=
```
Plot[{f'[x], Abs[f'[x]]}, {x, -3.2, -3}]
```

Out[ ]=



In[ ]:=
```
Plot[Abs[f'[x]], {x, -3.2, -3}]
```

Out[ ]=




```
(*m1 e minimalnata stoynost*)
```

In[ ]:=
```
m1 = Abs[f'[-3.]]
```

Out[ ]= 154.229

```
(*M1 e maksimalnata stoynost*)
```

In[ ]:=
```
M1 = Abs[f'[-3.2]]
```

Out[ ]= 160.069

In[•]:=
$$CC = \frac{M1 - m1}{m1}$$

Out[•]= 0.037861

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

In[•]:=
```
x0 = -3.;
p = -3.2;
M1 = Abs[f'[-3.2]];
m1 = Abs[f'[-3.]];
xpred = x0;
CC = (M1 - m1)/m1;
Print["n=0: x= ", x0, " f(x)= ", f[x0]];
For[n = 0, n ≤ 15, n++,
 xsled = xpred - f[xpred]/(f[xpred] - f[p]) (xpred - p);
 eps = CC * Abs[xsled - xpred];
 Print["n=", n + 1, " : x=",
  SetPrecision[xsled, 12], " f(x)=", f[xsled], " eps=", eps];
 xpred = xsled;
]
```

```
n=0: x= -3. f(x)= 637.465
n=1 : x=-1.97278866766 f(x)=113.377 eps=0.0134415
n=2 : x=-1.75813659375 f(x)=43.7762 eps=0.00280881
n=3 : x=-1.67020264828 f(x)=19.9228 eps=0.00115065
n=4 : x=-1.62910841242 f(x)=9.70405 eps=0.000537736
n=5 : x=-1.60883379310 f(x)=4.8795 eps=0.000265302
n=6 : x=-1.59857332950 f(x)=2.49244 eps=0.000134263
n=7 : x=-1.59331510013 f(x)=1.2833 eps=0.0000688062
n=8 : x=-1.59060317879 f(x)=0.663447 eps=0.0000354866
n=9 : x=-1.58919993742 f(x)=0.343714 eps=0.000018362
n=10 : x=-1.58847262825 f(x)=0.178263 eps=9.51715×10^-6
n=11 : x=-1.58809533047 f(x)=0.0925058 eps=4.9371×10^-6
n=12 : x=-1.58789951563 f(x)=0.0480181 eps=2.56232×10^-6
n=13 : x=-1.58779786531 f(x)=0.0249291 eps=1.33014×10^-6
n=14 : x=-1.58774509073 f(x)=0.0129432 eps=6.90578×10^-7
n=15 : x=-1.58771768962 f(x)=0.00672042 eps=3.58555×10^-7
n=16 : x=-1.58770346222 f(x)=0.00348947 eps=1.86172×10^-7
```

In[ ]:=
```
(*sus stop kriteriy*)
x0 = -3.;
p = -3.2;
M1 = Abs[f'[-3.2]];
m1 = Abs[f'[-3.]];
xpred = x0;
CC = (M1 - m1)/m1;
Print["n=0: x= ", x0, " f(x)= ", f[x0]];
epsusl = 10^(-5);
eps = 1;
For[n = 0, eps ≥ epsusl, n++,
 xsled = xpred - f[xpred]/(f[xpred] - f[p]) (xpred - p);
 eps = CC * Abs[xsled - xpred];
 Print["n=", n + 1, " : x=",
  SetPrecision[xsled, 12], " f(x)=", f[xsled], " eps=", eps];
 xpred = xsled;
]
```

```
n=0: x= -3. f(x)= 637.465
n=1 : x=-1.97278866766 f(x)=113.377 eps=0.0134415
n=2 : x=-1.75813659375 f(x)=43.7762 eps=0.00280881
n=3 : x=-1.67020264828 f(x)=19.9228 eps=0.00115065
n=4 : x=-1.62910841242 f(x)=9.70405 eps=0.000537736
n=5 : x=-1.60883379310 f(x)=4.8795 eps=0.000265302
n=6 : x=-1.59857332950 f(x)=2.49244 eps=0.000134263
n=7 : x=-1.59331510013 f(x)=1.2833 eps=0.0000688062
n=8 : x=-1.59060317879 f(x)=0.663447 eps=0.0000354866
n=9 : x=-1.58919993742 f(x)=0.343714 eps=0.000018362
n=10 : x=-1.58847262825 f(x)=0.178263 eps=9.51715×10^-6
```