

Nalezněte extrémy funkce  $f(x)$  na intervalu  $[-10, 10]$

$$f(x) = \frac{x^2 - 1}{x^2 - 5x + 6}$$

x	f(x)
-10	0.634615
-9.9	0.631946
-9.8	0.629237
-9.7	0.626489
-9.6	0.6237
-9.5	0.62087
-9.4	0.617997
-9.3	0.61508
-9.2	0.612119
-9.1	0.609113
-9	0.606061
-8.9	0.60296
-8.8	0.599812
-8.7	0.596613
-8.6	0.593364
-8.5	0.590062
-8.4	0.586707
-8.3	0.583298
-8.2	0.579832
-8.1	0.576309
-8	0.572727
-7.9	0.569085
-7.8	0.565382
-7.7	0.561615
-7.6	0.557783
-7.5	0.553885
-7.4	0.549918
-7.3	0.545882
-7.2	0.541773
-7.1	0.537591
-7	0.533333
-6.9	0.528998
-6.8	0.524583
-6.7	0.520085
-6.6	0.515504
-6.5	0.510836
-6.4	0.506079
-6.3	0.501231
-6.2	0.496288
-6.1	0.491249
-6	0.486111
-5.9	0.48087
-5.8	0.475524
-5.7	0.47007

max: 78.27272727

min: -82.33333333

-5.6	0.464504
-5.5	0.458824
-5.4	0.453024
-5.3	0.447103
-5.2	0.441057
-5.1	0.434881
-5	0.428571
-4.9	0.422124
-4.8	0.415535
-4.7	0.4088
-4.6	0.401914
-4.5	0.394872
-4.4	0.387669
-4.3	0.3803
-4.2	0.37276
-4.1	0.365043
-4	0.357143
-3.9	0.349054
-3.8	0.340771
-3.7	0.332286
-3.6	0.323593
-3.5	0.314685
-3.4	0.305556
-3.3	0.296196
-3.2	0.2866
-3.1	0.27676
-3	0.26667
-2.9	0.256313
-2.8	0.24569
-2.7	0.234789
-2.6	0.223602
-2.5	0.212121
-2.4	0.200337
-2.3	0.18824
-2.2	0.175824
-2.1	0.16308
-2	0.15
-1.9	0.136578
-1.8	0.122807
-1.7	0.108683
-1.6	0.094203
-1.5	0.079365
-1.4	0.064171
-1.3	0.048626
-1.2	0.032738
-1.1	0.016522
-1	3.11E-15
-0.9	-0.0168
-0.8	-0.03383

-0.7	-0.05105
-0.6	-0.06838
-0.5	-0.08571
-0.4	-0.10294
-0.3	-0.11989
-0.2	-0.13636
-0.1	-0.15207
0	-0.16667
0.1	-0.17967
0.2	-0.19048
0.3	-0.19826
0.4	-0.20192
0.5	-0.2
0.6	-0.19048
0.7	-0.17057
0.8	-0.13636
0.9	-0.08225
1	-1.1E-16
1.1	0.122807
1.2	0.305556
1.3	0.579832
1.4	1
1.5	1.666667
1.6	2.785714
1.7	4.846154
1.8	9.333333
1.9	23.72727
2	
2.1	-37.8889
2.2	-24
2.3	-20.4286
2.4	-19.8333
2.5	-21
2.6	-24
2.7	-29.9524
2.8	-42.75
2.9	-82.3333
3	
3.1	78.27273
3.2	38.5
3.3	25.35897
3.4	18.85714
3.5	15
3.6	12.45833
3.7	10.66387
3.8	9.333333
3.9	8.309942
4	7.5
4.1	6.844156

4.2	6.30303
4.3	5.849498
4.4	5.464286
4.5	5.133333
4.6	4.846154
4.7	4.594771
4.8	4.373016
4.9	4.176044
5	4
5.1	3.841782
5.2	3.698864
5.3	3.56917
5.4	3.45098
5.5	3.342857
5.6	3.24359
5.7	3.152152
5.8	3.067669
5.9	2.98939
6	2.916667
6.1	2.848938
6.2	2.785714
6.3	2.726568
6.4	2.671123
6.5	2.619048
6.6	2.570048
6.7	2.523864
6.8	2.480263
6.9	2.439037
7	2.4
7.1	2.362984
7.2	2.327839
7.3	2.294427
7.4	2.262626
7.5	2.232323
7.6	2.203416
7.7	2.175812
7.8	2.149425
7.9	2.124178
8	2.1
8.1	2.076824
8.2	2.054591
8.3	2.033243
8.4	2.012731
8.5	1.993007
8.6	1.974026
8.7	1.955748
8.8	1.938134
8.9	1.92115
9	1.904762

9.1	1.88894
9.2	1.873656
9.3	1.858882
9.4	1.844595
9.5	1.830769
9.6	1.817384
9.7	1.804419
9.8	1.791855
9.9	1.779673
10	1.767857

$x = 2$  a  $x = 3$  nepatří do definičního oboru

Najděte maximum funkce  $y = x^2 - 5$  na intervalu  $[0, 5]$  pomocí Řešitele

Max: 20

Příprava pro řešitele: 5





## Operace s maticemi

	$x_1$	$x_2$	$x_3$
$A =$	1	2	3
	4	5	6
	7	8	1

$b =$	5
	4
	2

Zkouška: $Ax =$	5
	4
	2

$A^T =$	1	4	7
	2	5	8
	3	6	1

$A * A^{-1} =$	1	1.11E-16	0
	-3.331E-16	1	0
	-5.551E-17	0	1

$A^{-1} =$	-1.79167	0.916666667
	1.583333	-0.833333333
	-0.125	0.25

$$x = A^{-1} b =$$

$(A^{-1})^{-1} =$	1	2
	4	5
	7	8

$A^{-1} * A =$	1	0
	2.22E-16	1
	0	-1.11022E-16

Matice 1

-0.125
0.25
-0.125

-5.54167
5.083333
0.125

$x_1$

$x_2$

$x_3$

3
6
1

0
0
1

Operace s maticemi 2

	$x_1$	$x_2$	$x_3$	$x_4$
$A =$	5	8	1	2
	2	5	4	3
	6	8	1	4
	4	9	7	2

$A^{-1} =$	-0.85047
	0.728972
	-0.42991
	-0.07477

$b =$	1
	8
	7
	3

$x =$

Zkouška: $Ax =$	1
	8
	7
	3

$A^T =$	5	2	6	4
	8	5	8	9
	1	4	1	7
	2	3	4	2

$(A^{-1})^{-1} =$	5
	2
	6
	4

$A * A^{-1} =$	1	-4.44089E-16	2.22E-16	3.33E-16
	-5.551E-16	1	2.78E-16	2.22E-16
	-4.441E-16	-2.22045E-16	1	2.22E-16
	-5.274E-16	-7.77156E-16	4.72E-16	1

$A^{-1} * A =$	1
	2.22E-16
	0
	0

-0.878504673	0.831776	0.504672897
0.46728972	-0.57009	-0.289719626
-0.224299065	0.233645	0.299065421
0.439252336	0.084112	-0.252336449

$$A^{-1}b = \begin{array}{l} \begin{array}{|c|} \hline -0.54206 \\ \hline \end{array} \\ \begin{array}{|c|} \hline -0.39252 \\ \hline \end{array} \\ \begin{array}{|c|} \hline 0.308411 \\ \hline \end{array} \\ \begin{array}{|c|} \hline 3.271028 \\ \hline \end{array} \end{array} \begin{array}{l} x_1 \\ x_2 \\ x_3 \\ x_4 \end{array}$$

8	1	2
5	4	3
8	1	4
9	7	2

-1.77636E-15	0	-6.66134E-16
1	0	1.11022E-16
4.44089E-16	1	0
0	2.22E-16	1

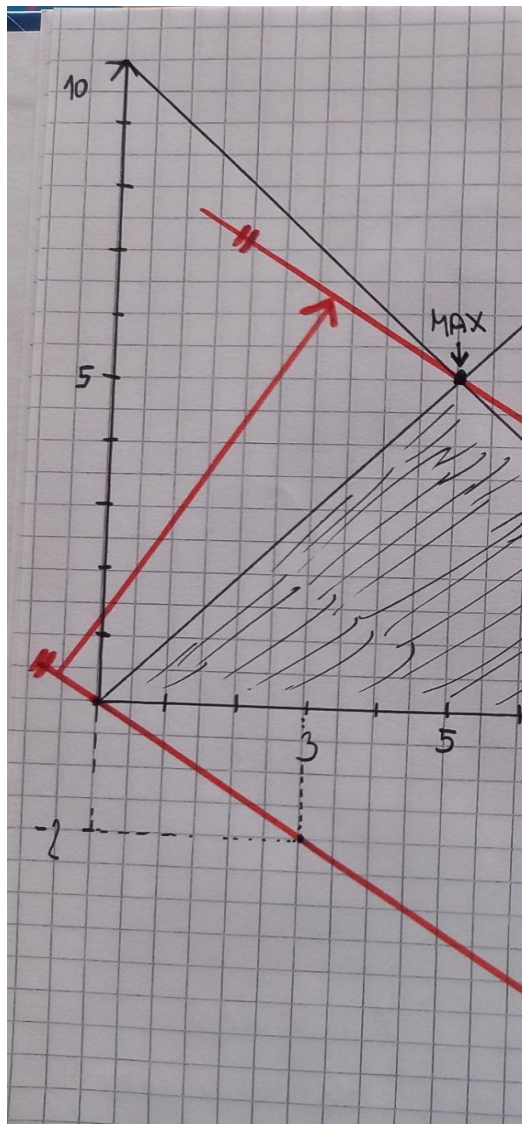
Najděte graficky maximum funkce  $2x+3y$  za podmínek  $x,y \geq 0$ ,  $x+y \leq 10$  a  $x \geq y$

Cílová funkce:  $2x+3y$

Podmínky:  
 $x+y \leq 10$   
 $x \geq y$   
 $x > 0$   
 $y > 0$

Maximum:  $x=5$   
 $y=5$

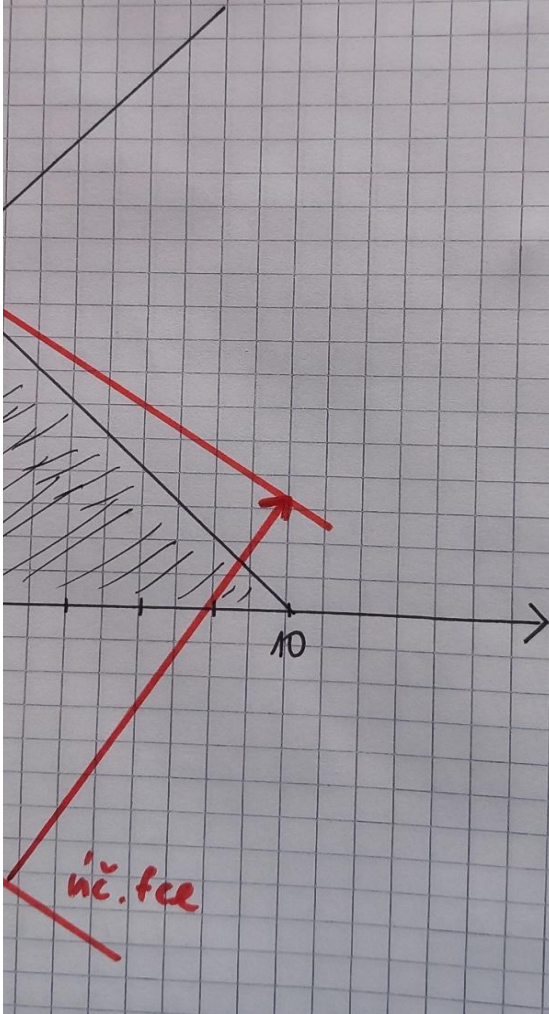
Cílová funkce: 25



$$2x + 3y = 0$$

$$y = -\frac{2}{3}x$$

x	0	3
y	0	-2



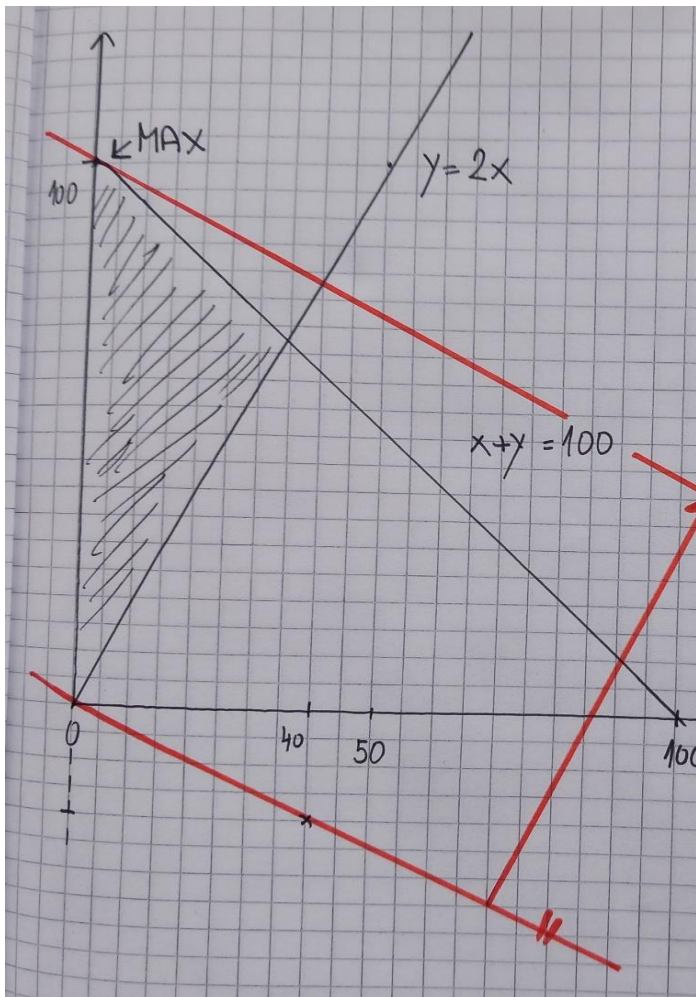
Najděte graficky maximum funkce  $x+2y$  za podmínek  $x, y \geq 0$ ,  $x+y \leq 100$  a  $2x \leq y$

Cílová funkce:  $x+2y$

Podmínky:  
 $x+y \leq 100$   
 $2x \leq y$   
 $x > 0$   
 $y > 0$

Maximum:  $x=0$   
 $y=100$

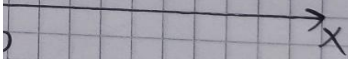
Cílová funkce: 200



$$x + 2y = 0$$

$$y = -\frac{1}{2}x$$

$$\begin{array}{r|l} x & 0 \quad 40 \\ y & 0 \quad -20 \end{array}$$





**Řešte pomocí Řešitele:**

$$x_1^2 + x_2^2 + 3x_3^2 + 4x_4^2 \rightarrow \max;$$

s.t.

$$(x_1 - 1)^2 + (x_2 - 2)^2 + (x_3 - 3)^2 + (x_4 - 4)^2 \leq 169$$

$$x_j \geq 0, \quad j = 1, 2, 3, 4.$$

x1	x2	x3	x4
1.232978	2.465947	6.926346	16.38194

f(x)
1224.996

**Podmínky:**

L	P
169	169

Řešte pomocí Řešitele:

Najděte maximum funkce  $x*y*z$  za podmínek nezápornosti a  $x+y+z \leq 12$

x	y	z	cílová f
4	4	4	64

podmínky

L	P
12	12