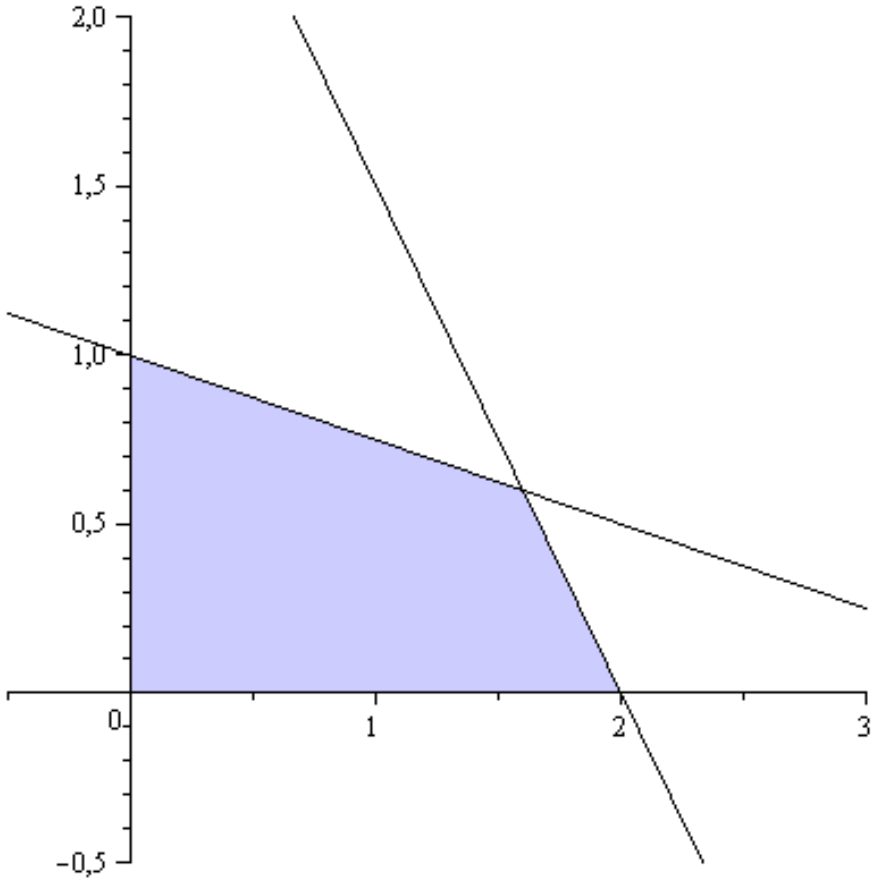
Seminář 6

Příklad 1: Použitím grafické metody řešte problém lineárního programování: **a)** max 3x_1 + 4x_2 3x_1 + 2x_2 <= 6 x_1 + 4x_2<= 4 x_1 >=0, x_2>= 0

$cnsts := [3x + 2y \le 6, x + 4y \le 4, 0 \le x, 0 \le y];$

$$[3x + 2y \le 6, x + 4y \le 4, 0 \le x, 0 \le y]$$

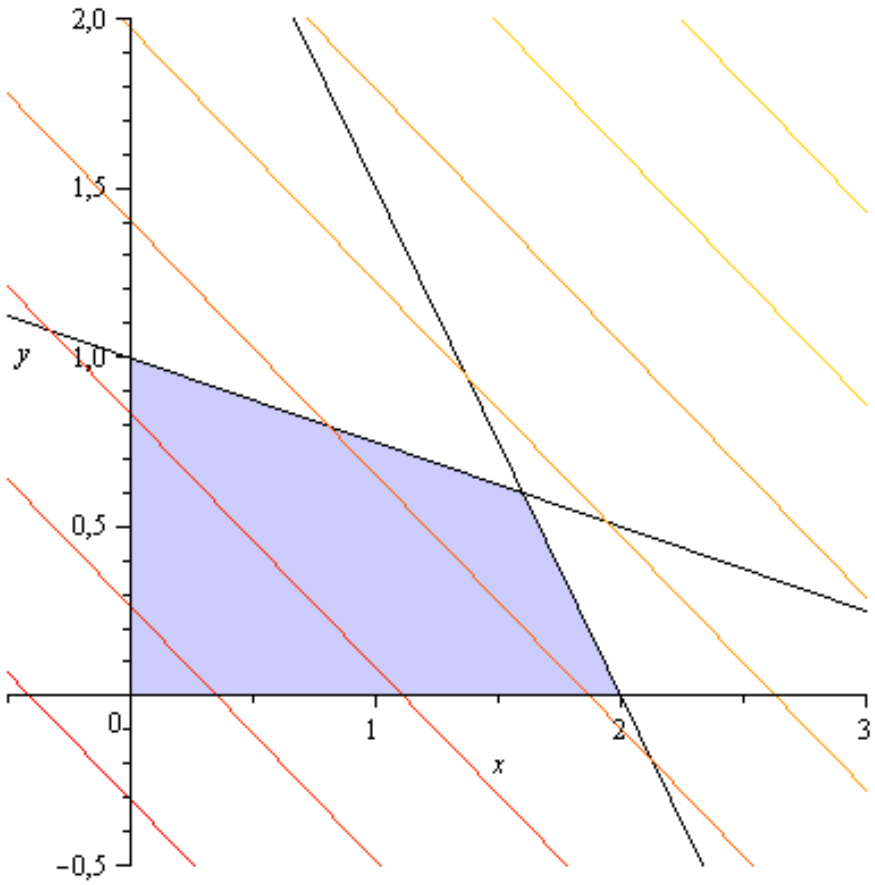
$with(plots) : feasibleRegion := inequal(cnsts, x = -0.5..3, y = -0.5..2, optionsexcluded = (colour = white)) :$
$display(feasibleRegion);$



$obj := 3x + 4y;$

$$3x + 4y$$

$contours := contourplot(obj, x = -0.5..3, y = -0.5..2) :$
$display(feasibleRegion, contours);$

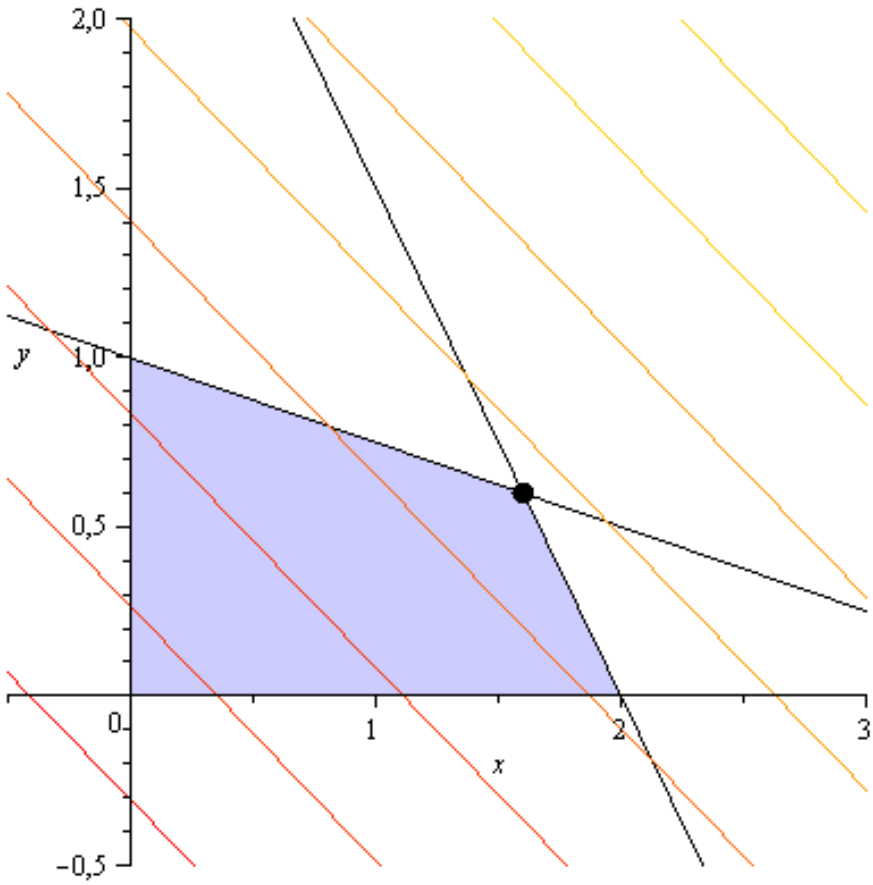


$solve(\{3x + 2y = 6, x + 4y = 4\});$

$$\left\{y = \frac{3}{5}, x = \frac{8}{5}\right\}$$

$optimalPoint := pointplot\left(\left\{\left[\frac{8}{5}, \frac{3}{5}\right]\right\}, symbolsize = 22, symbol = solidcircle\right):$

$display(feasibleRegion, contours, optimalPoint);$

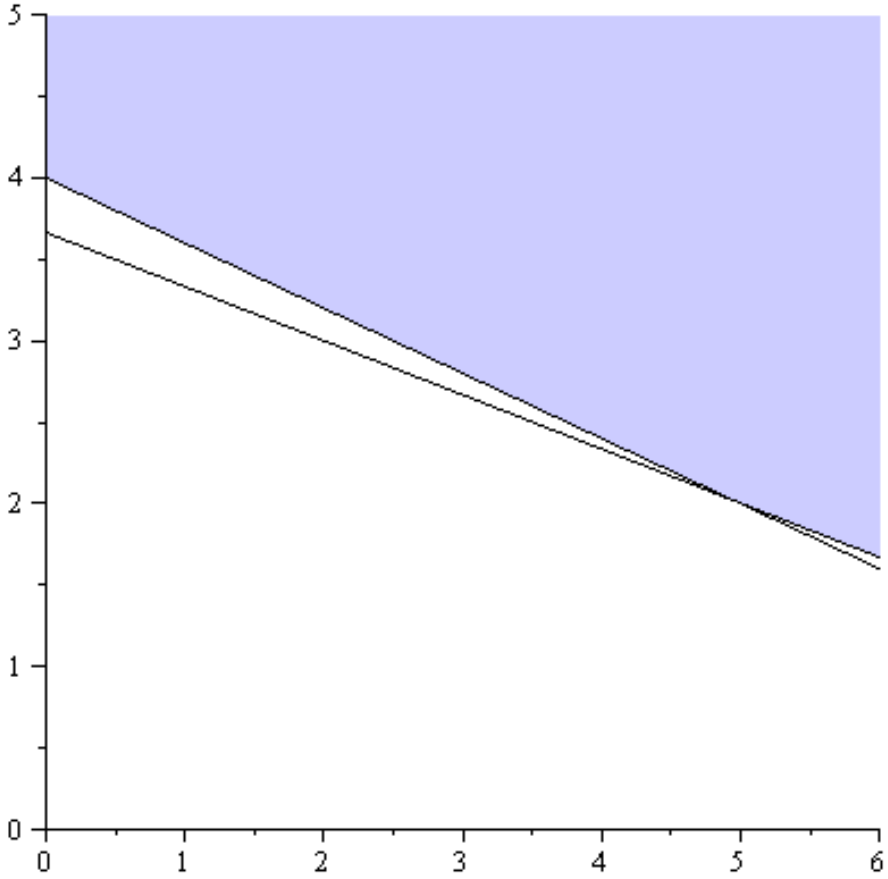


b) min 10u_1 + 27u_2 s podmínkami u_1 + 3u_2 >= 112u_1 + 5u_2>= 20 u_1 >= 0, u_2>= 0

$cnsts := [x + 3\,y \geq 11, 2\,x + 5\,y \geq 20, 0 \leq x, 0 \leq y];$

$[11 \leq x + 3\,y, 20 \leq 2\,x + 5\,y, 0 \leq x, 0 \leq y]$

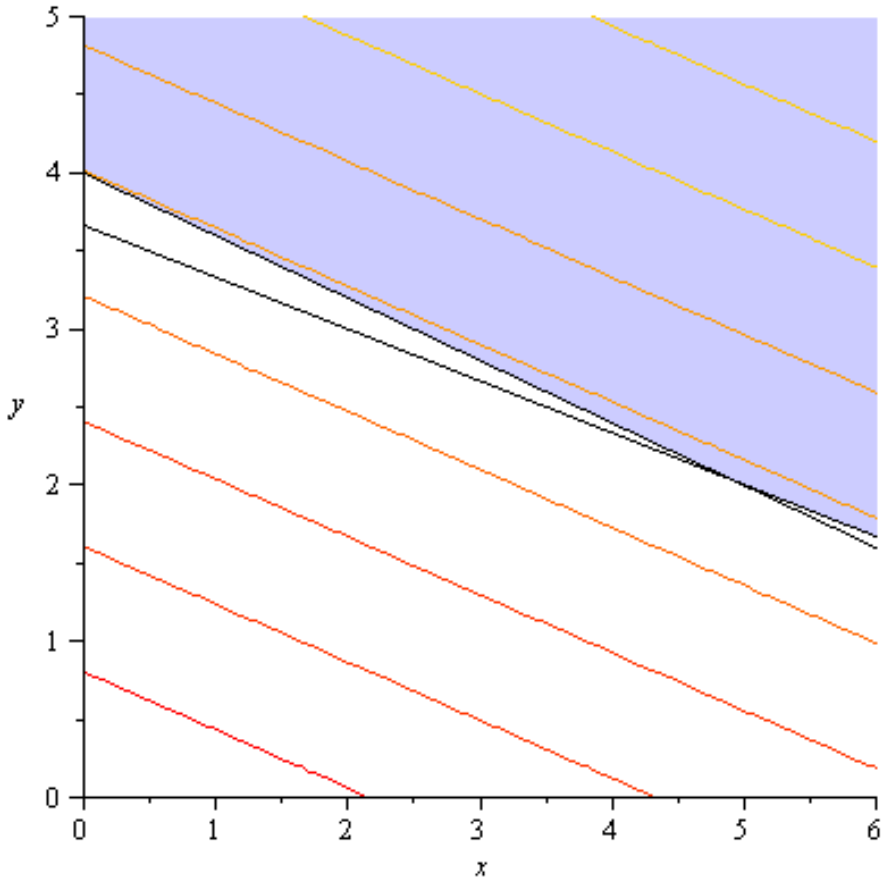
$with(plots) : feasibleRegion := inequal(cnsts, x = 0..6, y = 0..5,$
$optionsexcluded = (colour = white)) : display(feasibleRegion);$



$obj := 10x + 27y;$

$$10x + 27y$$

$contours := contourplot(obj, x = 0..6, y = 0..5):$
$display(feasibleRegion, contours);$

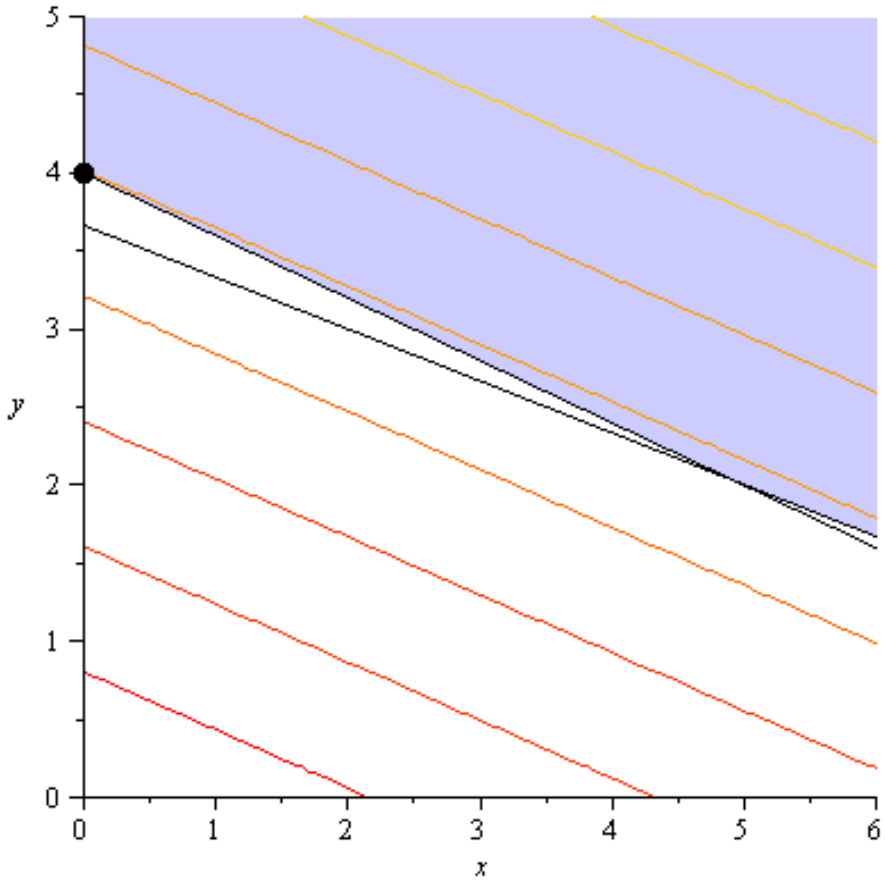


$solve(\{3x + 2y = 6, x + 4y = 4\});$

$$\left\{y = \frac{3}{5}, x = \frac{8}{5}\right\}$$

$optimalPoint := pointplot(\{[0, 4]\}, symbolsize = 22, symbol = solidcircle) :$

$display(feasibleRegion, contours, optimalPoint);$



Příklad 2: Použitím grafické metody řešte problém lineárního programování:

a) x_1 + 5x_2 s podmí-2x_1 + 3x_2 <=67x_1 - 2x_2 <=14x_1 + x_2 <=5 x_1 >= 0, x_2>= 0

$$cnsts := [-2x + 3y \le 6, 7x - 2y \le 14, x + y \le 5, 0 \le x, 0 \le y];$$

$$[-2x + 3y \le 6, 7x - 2y \le 14, x + y \le 5, 0 \le x, 0 \le y]$$

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with(plots):feasibleRegion := inequal(cnsts, x =-0.5..3, y =-0.5
    ..4, optionsexcluded = (colour = white)):
display(feasibleRegion);
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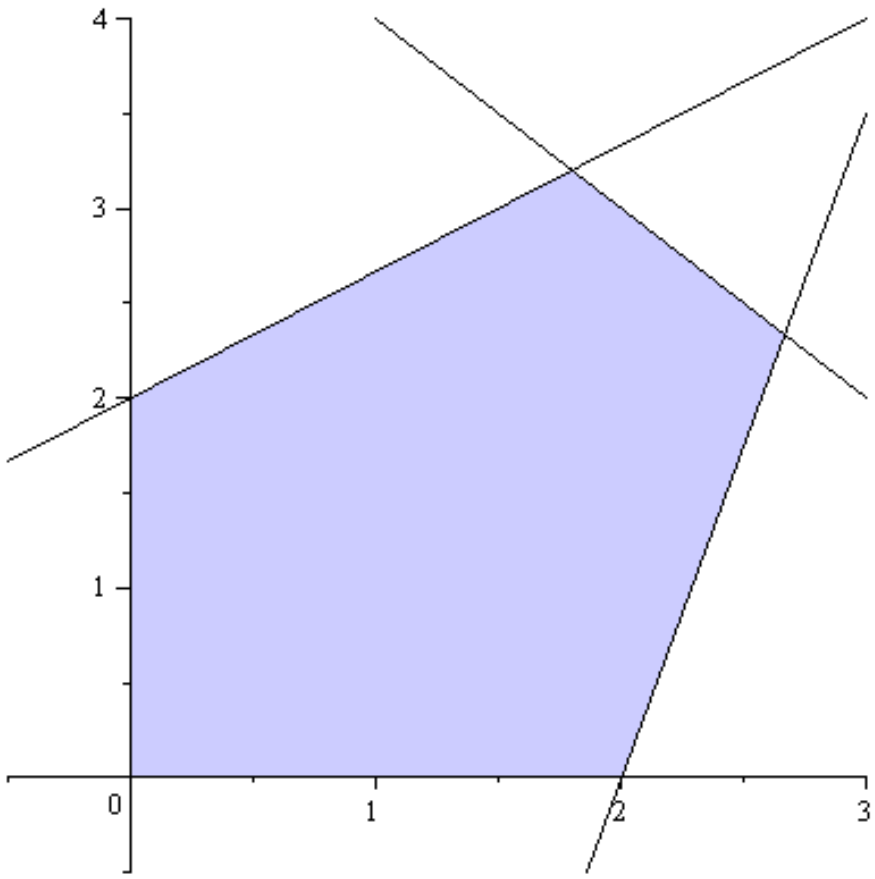
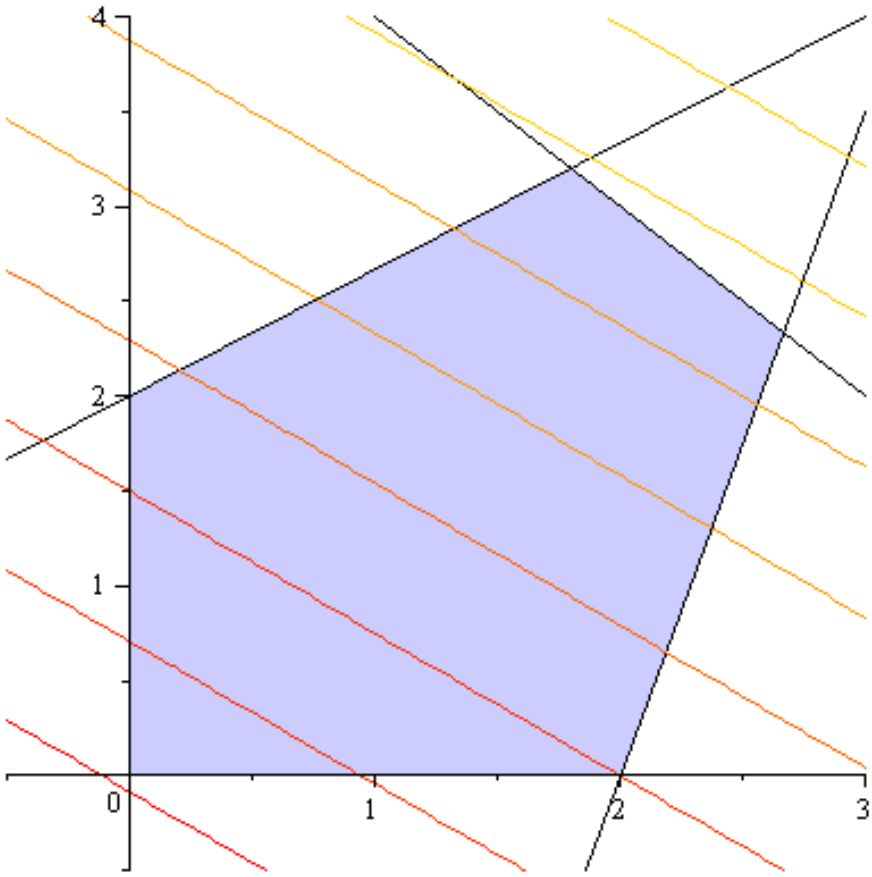


$obj := 2x + 5y;$
$contours := contourplot(obj, x = -0.5..3, y = -0.5..4):$
$display(feasibleRegion, contours);$

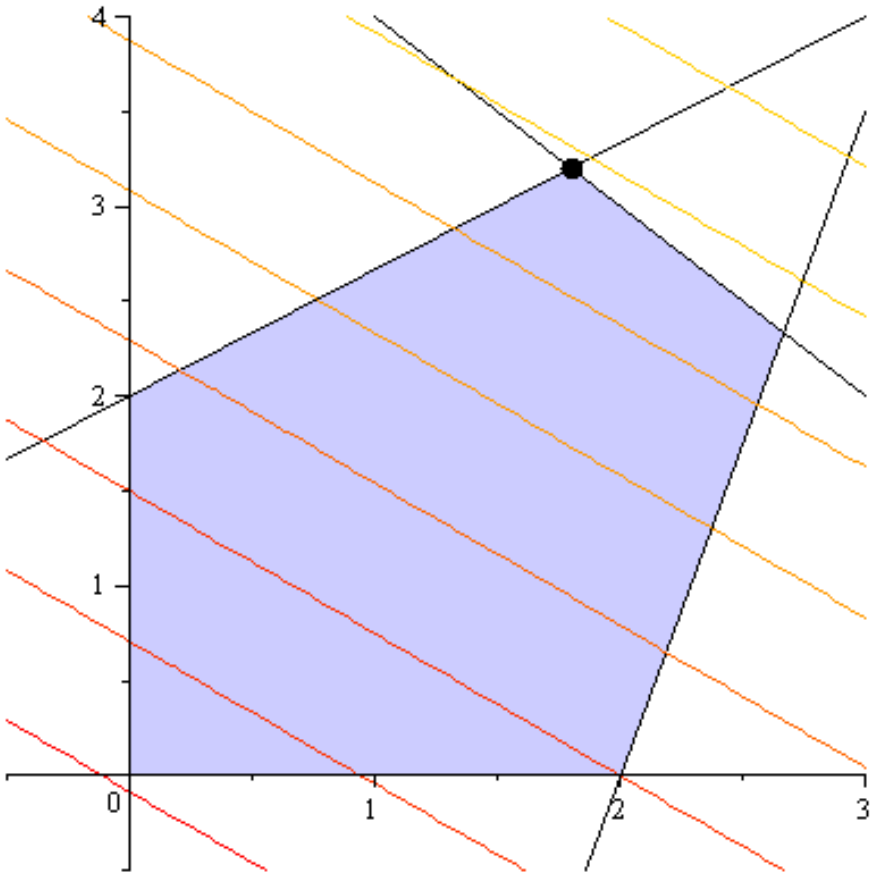


$solve(\{-2x + 3y = 6, x + y = 5\});$

$$\left\{y = \frac{16}{5}, x = \frac{9}{5}\right\}$$

$optimalPoint := pointplot\left(\left\{\left[\frac{9}{5}, \frac{16}{5}\right]\right\}, symbolsize = 22, symbol = solidcircle\right):$

$display(feasibleRegion, contours, optimalPoint);$

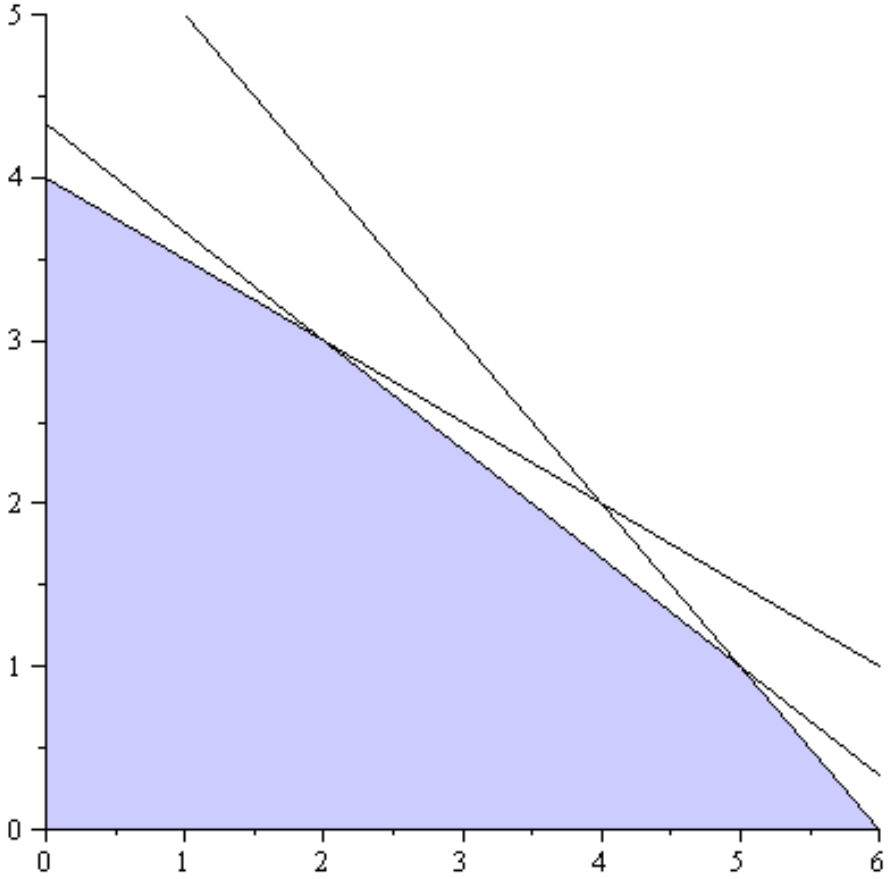


b) max 8x_1 + 9x_2 s podmínkami x_1 + 2x_2 <= 82x_1 + 3x_2<= 13x_1 + x_2<= 6 x_1 >= 0, x_2>= 0

$cnsts := [x + 2y \le 8, 2x + 3y \le 13, x + y \le 6, 0 \le x, 0 \le y];$

$[x + 2y \le 8, 2x + 3y \le 13, x + y \le 6, 0 \le x, 0 \le y]$

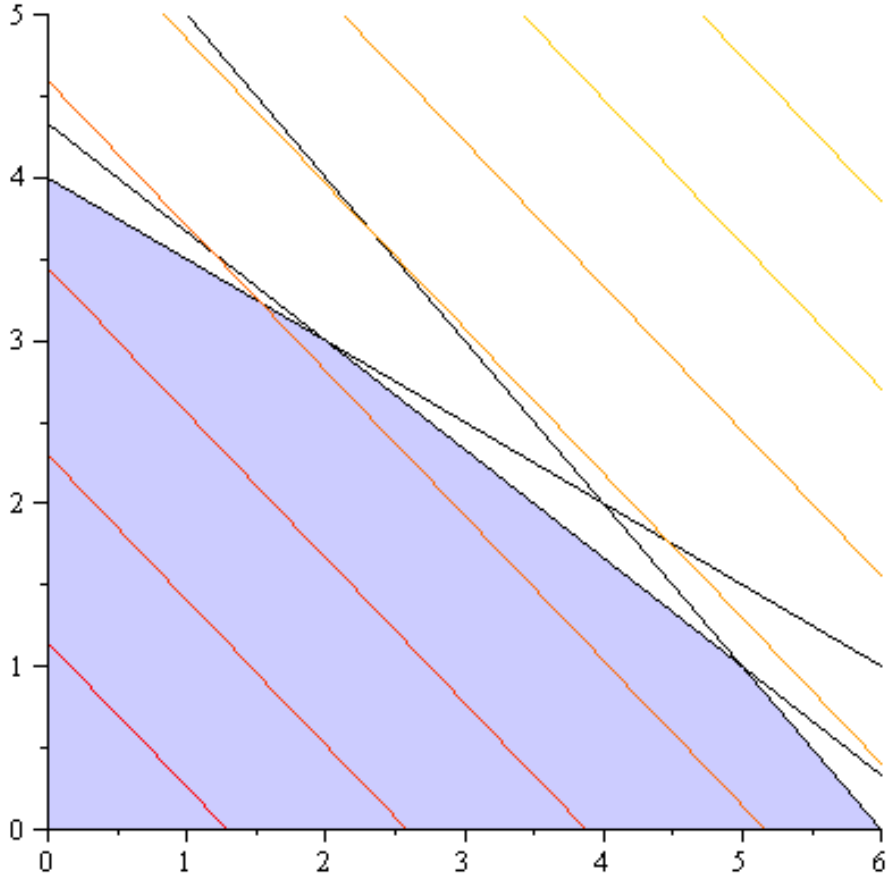
$with(plots) : feasibleRegion := inequal(cnsts, x = 0..6, y = 0..5,$
$optionsexcluded = (colour = white)) : display(feasibleRegion);$



$obj := 8x + 9y;$

$$8x + 9y$$

$contours := contourplot(obj, x = 0..6, y = 0..5):$
$display(feasibleRegion, contours);$

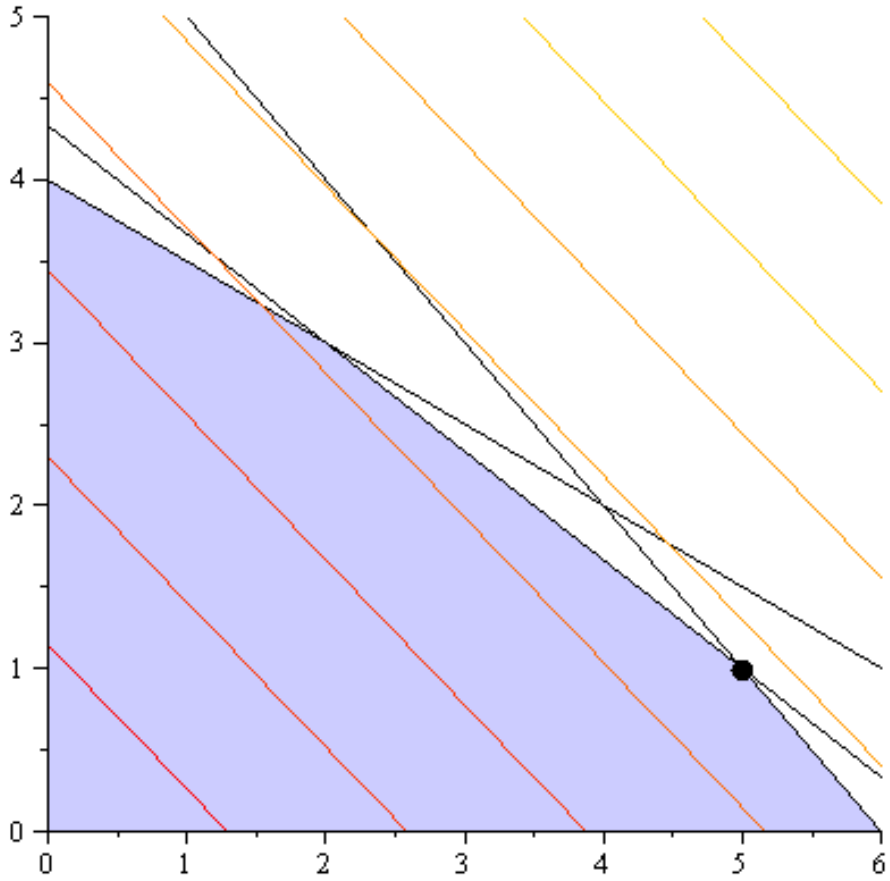


$solve(\{2x + 3y = 13, x + y = 6\});$

$$\{y = 1, x = 5\}$$

$optimalPoint := pointplot(\{[5, 1]\}, symbolsize = 22, symbol = solidcircle) :$

$display(feasibleRegion, contours, optimalPoint);$

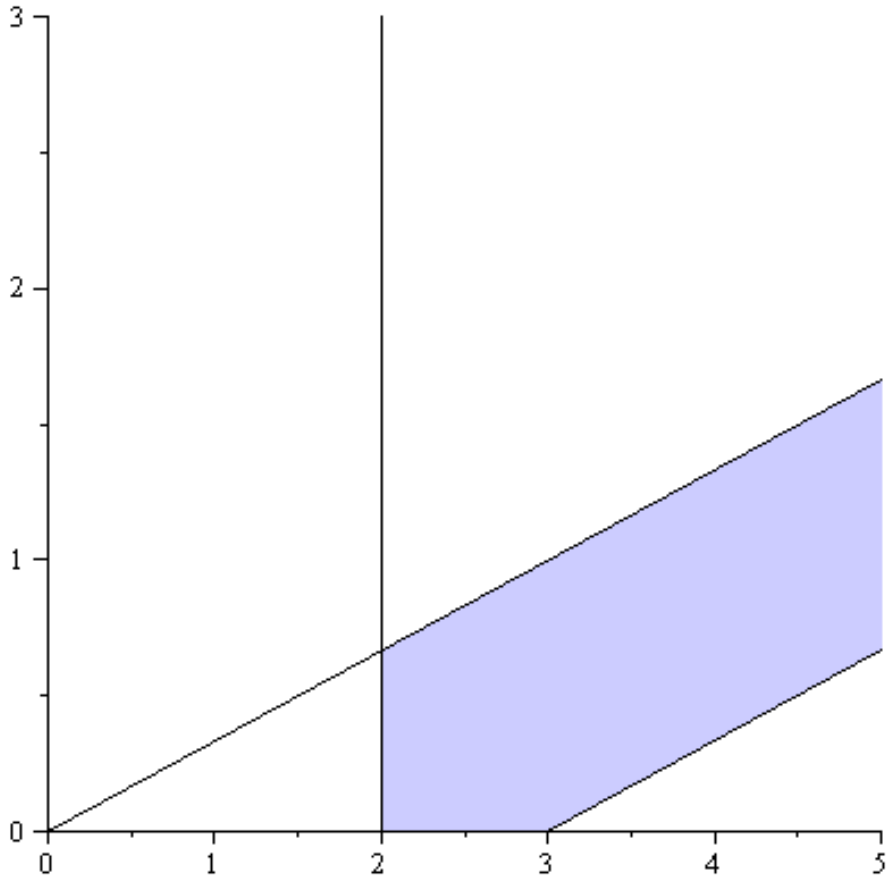


c) max -2x_1 + x_2 s podmínkami 0 <= x_1 - 3x_2 <= 3, x_1 >= 2, x_1 >= 0, x_2>= 0

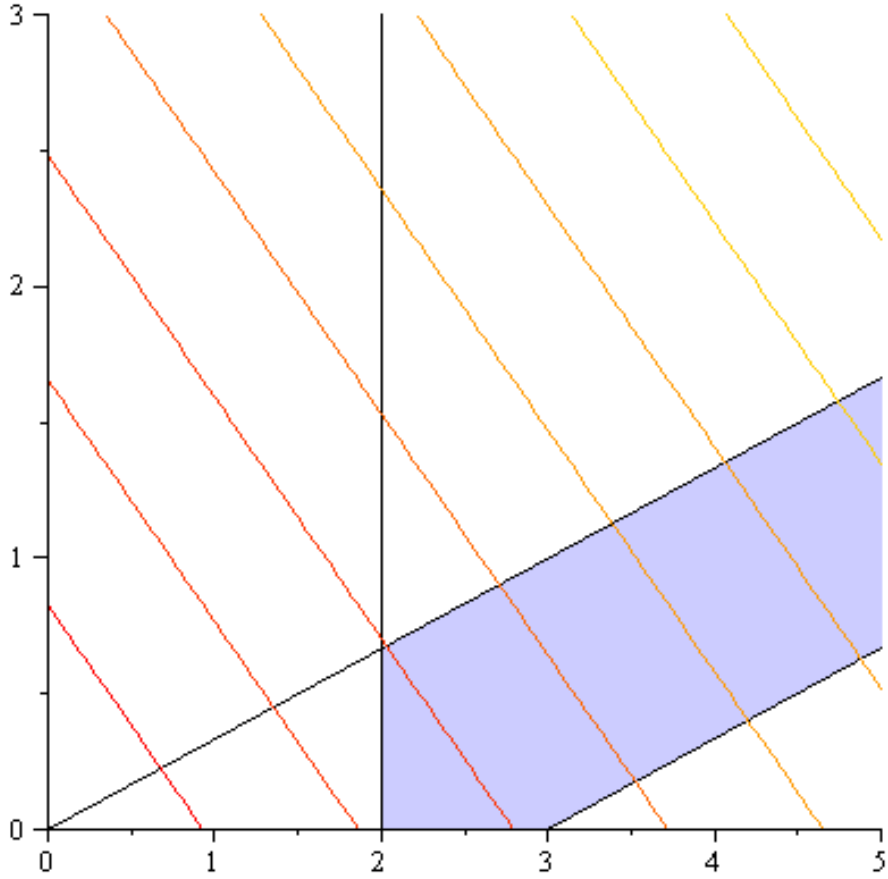
$cnsts := [0 \le x - 3y,\ x - 3y \le 3,\ x \ge 2, 0 \le x, 0 \le y];$

$$[0 \le x - 3y, x - 3y \le 3, 2 \le x, 0 \le x, 0 \le y]$$

$with(plots) : feasibleRegion := inequal(cnsts, x = 0..5, y = 0..3,$
$optionsexcluded = (colour = white)) : display(feasibleRegion);$



$obj := -2x + y;$
$contours := contourplot(obj, x = 0..5, y = 0..3):$
$display(feasibleRegion, contours);$


3
2
1
0
0
1
2
3
4
5