APA a.a. 22/23 - Programmazione Lineare

Lontani dal caso peggiore: Programmazione Lineare (Compito 3.1 delle note)

```
%pip install pulp
%pip install numpy
%pip install matplotlib
```

```
import pulp

my_lp_problem = pulp.LpProblem("My LP Problem", pulp.LpMinimize)

# Variables
x = pulp.LpVariable('x', lowBound=0, cat='Continuous')
y = pulp.LpVariable('y', lowBound=0, cat='Continuous')

# Objective function
my_lp_problem += - y + 1/2*x, "Z"

# Constraints
my_lp_problem += y - x <= 0
my_lp_problem += y - 1 <= 0
my_lp_problem += y + x - 4 <= 0

# Solve
my_lp_problem.solve()
print("Status:", pulp.LpStatus[my_lp_problem.status])

# Print the solution
for variable in my_lp_problem.variables():
    print("{} = {}".format(variable.name, variable.varValue))

print("Z = {}".format(pulp.value(my_lp_problem.objective)))
```

```
import numpy as np
import matplotlib.pyplot as plt
%matplotlib inline

# Definizione del primo Quadrante
x = np.linspace(0, 10, 100)
y = np.linspace(0, 10, 100)

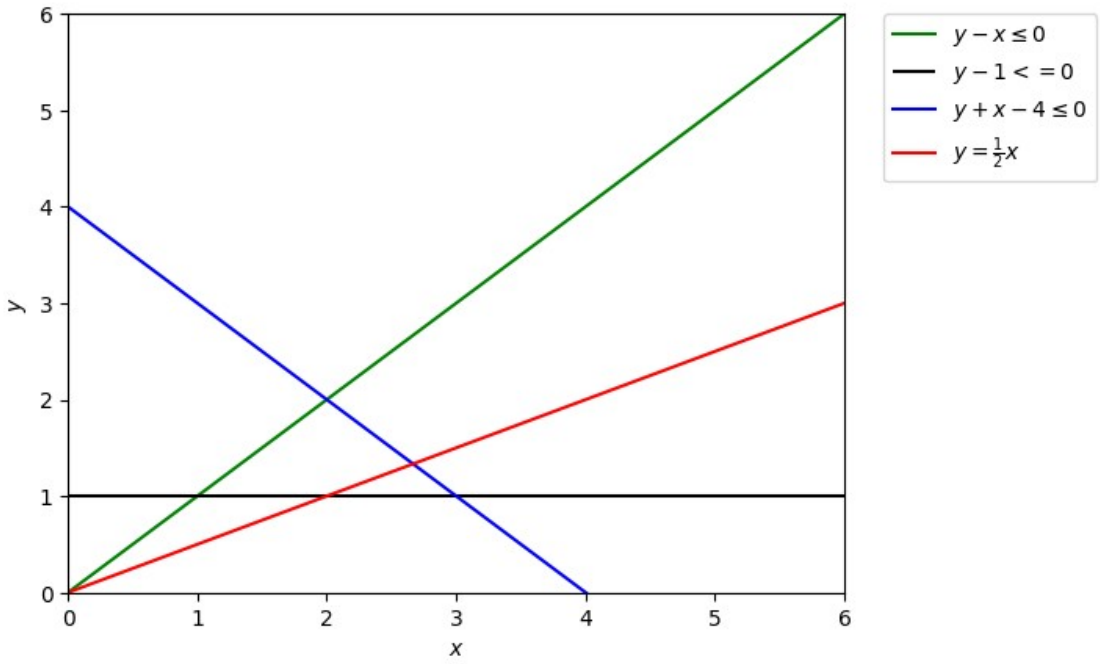
# Definizione dei vincoli

# Vincolo v1 y -x <= 0
y1 = x
# Vincolo v2 y -1 <= 0
y2 = 1
```

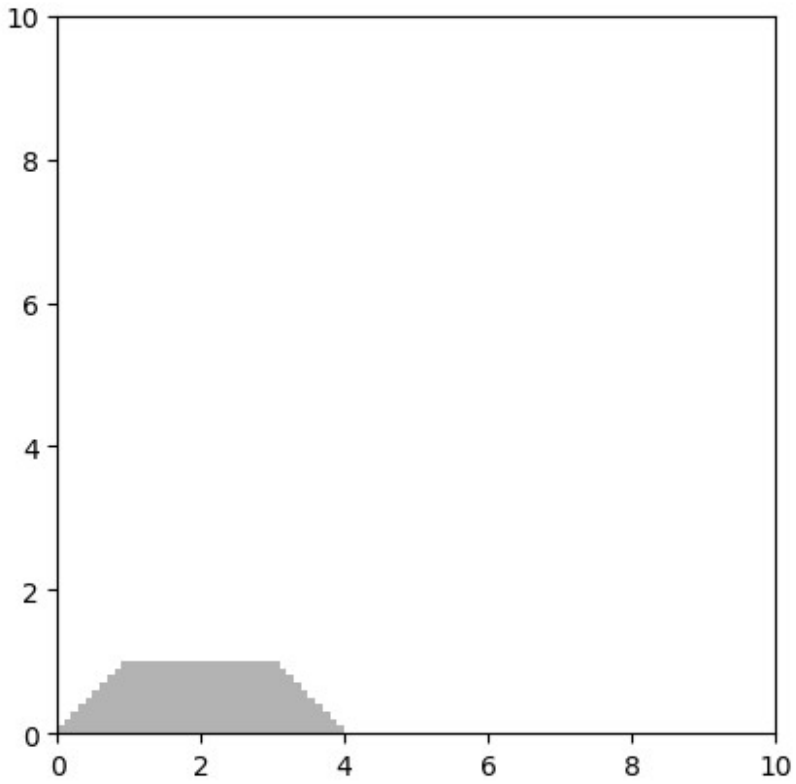
```
# Vincolo v3 y + x - 4 <= 0
y3 = -x + 4

# Definizione della funzione obiettivo
y4 = 1/2*x

# Plotting
plt.plot(x, y1, label=r'$y - x \leq 0$', color='g')
plt.hlines(y=1, xmin=0, xmax=100, label=r'$y -1 <= 0$', color='k')
plt.plot(x, y3, label=r'$y + x - 4 \leq 0$', color='b')
plt.plot(x, y4, label=r'$y = \frac{1}{2}x$', color='r')
plt.xlim(0, 6)
plt.ylim(0, 6)
plt.xlabel(r'$x$')
plt.ylabel(r'$y$')
plt.legend(bbox_to_anchor=(1.05, 1), loc=2, borderaxespad=0.)
plt.show()
```




```
# Calcolo della regione ammissibile
X, Y = np.meshgrid(x, y)
Z = (Y>=0) & (Y - X<= 0) & (Y - 1<=0) & (Y + X - 4<=0)
plt.imshow(Z, extent=(x.min(),x.max(),y.min(),y.max()),
origin="lower", cmap="Greys", alpha = 0.3)
plt.show()
```




```
y = np.linspace(0, 10, 100)
x = np.linspace(0, 10, 100)
X, Y = np.meshgrid(x, y)
plt.imshow((Y>=0) & (Y - X<= 0) & (Y - 1<=0) & (Y + X -
4<=0).astype(int),
extent=(x.min(),x.max(),y.min(),y.max()),origin="lower", cmap="Greys",
alpha = 0.3)
plt.plot(x, y1, label=r'$y - x \leq 0$', color='g')
plt.hlines(y=1, xmin=0, xmax=100, label=r'$y -1 <= 0$', color='k')
plt.plot(x, y3, label=r'$y + x - 4 \leq 0$', color='b')
plt.plot(x, y4, label=r'$y = \frac{1}{2}x$', color='r')
plt.xlim(0, 6)
plt.ylim(0, 6)
plt.xlabel(r'$x$')
plt.ylabel(r'$y$')
plt.legend(bbox_to_anchor=(1.05, 1), loc=2, borderaxespad=0.)
plt.show()
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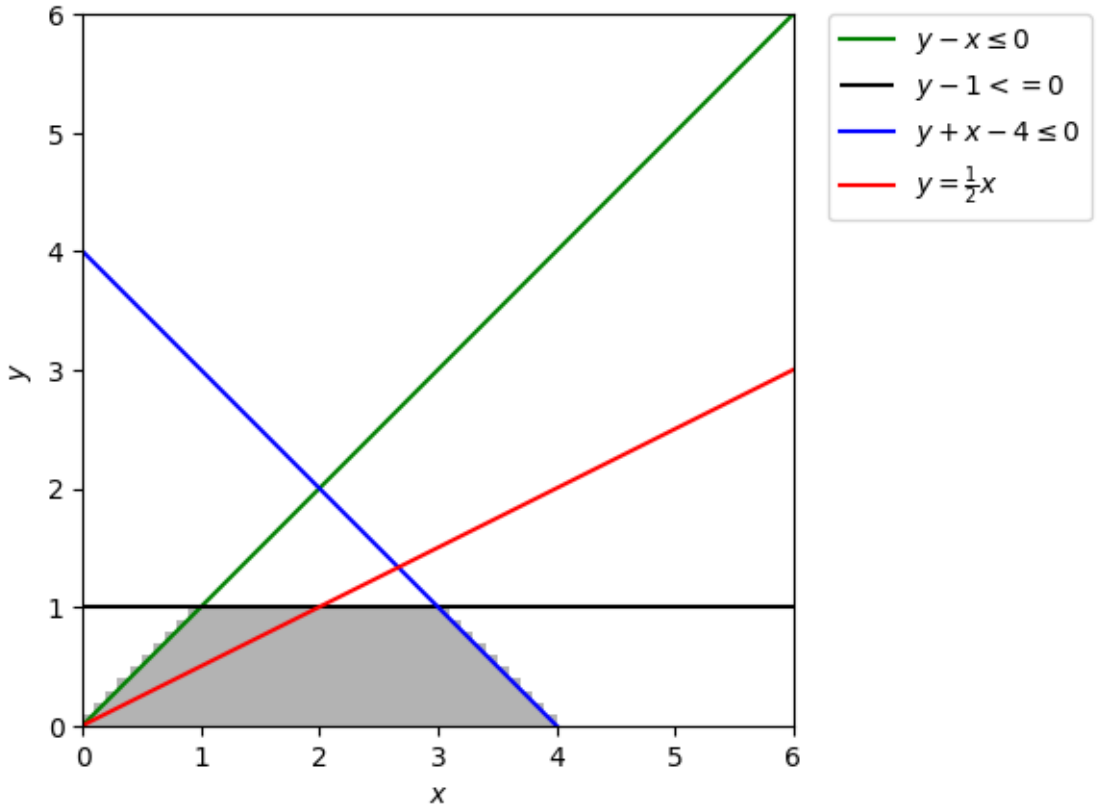
$y - x \leq 0$
$y - 1 < = 0$
$y + x - 4 \leq 0$
$y = \frac{1}{2}x$
y
x
0
1
2
3
4
5
6