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**TUTORIAL-1**

In [ ]: ▶| 
```
pip install pyatom
```

```
Collecting pyatom
  Downloading https://files.pythonhosted.org/packages/e3/1b/ea029151d3ff734277c2adbd20addd9f
ee8e7105ec8659ffcb0834a29312/pyatom-0.0.10-py3-none-any.whl (https://files.pythonhosted.org/
packages/e3/1b/ea029151d3ff734277c2adbd20addd9fee8e7105ec8659ffcb0834a29312/pyatom-0.0.10-py
3-none-any.whl)
Installing collected packages: pyatom
Successfully installed pyatom-0.0.10
```

In [ ]: ▶| 
```
pip install -i https://pypi.gurobi.com gurobipy
```

```
Looking in indexes: https://pypi.gurobi.com (https://pypi.gurobi.com)
Collecting gurobipy
  Downloading https://pypi.gurobi.com/gurobipy/gurobipy-9.1.1-cp36-cp36m-manylinux1_x86_64.w
hl (https://pypi.gurobi.com/gurobipy/gurobipy-9.1.1-cp36-cp36m-manylinux1_x86_64.whl) (11.1M
B)
     |████████████████████████████████| 11.1MB 680kB/s
Installing collected packages: gurobipy
Successfully installed gurobipy-9.1.1
```

In [ ]: ▶| 
```
pip install rsome
```

```
Collecting rsome
  Downloading https://files.pythonhosted.org/packages/af/89/89da29b18d1aa5d033fc7d01f8e50b87
d18a4ccaf88aa82e4a34d8ddb4bf/rsome-0.0.7-py3-none-any.whl (https://files.pythonhosted.org/pa
ckages/af/89/89da29b18d1aa5d033fc7d01f8e50b87d18a4ccaf88aa82e4a34d8ddb4bf/rsome-0.0.7-py3-no
ne-any.whl)
Installing collected packages: rsome
Successfully installed rsome-0.0.7
```

In [ ]: ▶|
```python
#Example-1_Linear Programming in gurobi

#Examples 1:
#Maximize objective function 3x+4y
#where the constraints are
#2.5x+y<=20,
#3x+3y<=30,
#x+2y<=16,
#x<=3,
#|y|<=2

import pyatom.lp as lp
import pyatom.grb_solver as grb

model = lp.Model()
x = model.dvar()
y = model.dvar()

model.max(3*x + 4*y)
model.st(2.5*x + y <= 20)
model.st(3*x + 3*y <= 30)
model.st(x + 2*y <= 16)
model.st(x <= 3)
model.st(abs(y) <= 2)

model.solve(grb)
```

```
Restricted license - for non-production use only - expires 2022-01-13
Being solved by Gurobi...
Solution status: 2
Running time: 0.0008s
```

In [ ]: ▶|
```python
print(model.get())
print(x.get())
print(y.get())
```

```
17.0
[3.]
[2.]
```

In [ ]: ▶|
```python
model.do_math()
```

Out[6]: 
```
Linear program object:
============================================
Number of variables:          3
Continuous/binaries/integers: 3/0/0
--------------------------------------------
Number of linear constraints: 6
Inequalities/equalities:      6/0
Number of coefficients:       11
```

In [ ]: ▶
```python
#Example-2_Robust Optimization
#Example-2:
#Maximize objective function 3x+4y
#s.t. 2.5x+y<=20,
#5x+3y<=30,
#x+2y<=16,
#|y|<=2,

from rsome import ro
from rsome import grb_solver as grb

model = ro.Model('LP model')
x = model.dvar()
y = model.dvar()

model.max(3*x + 4*y)
model.st(2.5*x + y <= 20)
model.st(5*x + 3*y <= 30)
model.st(x + 2*y <= 16)
model.st(abs(y) <= 2)

model.solve(grb)
```

```
Being solved by Gurobi...
Solution status: 2
Running time: 0.0007s
```

In [ ]: ▶
```python
print('x:', x.get())
print('y:', y.get())
print('Objective:', model.get())
```

```
x: [4.8]
y: [2.]
Objective: 22.4
```

In [ ]: ▶
```python
formula = model.do_math()
print(formula)
```

```
Second order cone program object:
===========================================
Number of variables:          3
Continuous/binaries/integers: 3/0/0
-------------------------------------------
Number of linear constraints: 6
Inequalities/equalities:      6/0
Number of coefficients:       11
-------------------------------------------
Number of SOC constraints:    0
```