Optimisation

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Ex1 :

```python
import pulp as p
Lp_prob = p.LpProblem('Problem', p.LpMaximize)
# Create problem Variables
x = p.LpVariable("x", LowBound = 0)    # Create a variable x >= 0
y = p.LpVariable("y", LowBound = 0)    # Create a variable y >= 0

# Objective Function
Lp_prob += 40 * x + 50 * y

# Constraints:
Lp_prob += 2 * x +  y <= 800
Lp_prob += x + 2 * y <= 700
Lp_prob += y <= 300

# Display the problem
print(Lp_prob)

status = Lp_prob.solve()    # Solver
print(p.LpStatus[status])   # The solution status

# Printing the final solution
print(p.value(x), p.value(y), p.value(Lp_prob.objective))
import pulp as p
Lp_prob = p.LpProblem('Problem', p.LpMaximize)
# Create problem Variables
x = p.LpVariable("x", LowBound = 0)    # Create a variable x >= 0
y = p.LpVariable("y", LowBound = 0)    # Create a variable y >= 0

# Objective Function
Lp_prob += 40 * x + 50 * y

# Constraints:
Lp_prob += 2 * x +  y <= 800
Lp_prob += x + 2 * y <= 700
Lp_prob += y <= 300
```

```python
# Display the problem
print(Lp_prob)

status = Lp_prob.solve()    # Solver
print(p.LpStatus[status])   # The solution status

# Printing the final solution
print(p.value(x), p.value(y), p.value(Lp_prob.objective))
```

resultat :

```
 printingOptions all solution C:\Users\Hedia\AppData\Local\Temp\e523db1ca8da433fbb01903e0a2055c4-pulp.sol (defa
ult strategy 1)
At line 2 NAME          MODEL
At line 3 ROWS
At line 8 COLUMNS
At line 16 RHS
At line 20 BOUNDS
At line 21 ENDATA
Problem MODEL has 3 rows, 2 columns and 5 elements
Coin0008I MODEL read with 0 errors
Option for timeMode changed from cpu to elapsed
Presolve 2 (-1) rows, 2 (0) columns and 4 (-1) elements
0  Obj -0 Dual inf 89.999998 (2)
2  Obj 22000
Optimal - objective value 22000
After Postsolve, objective 22000, infeasibilities - dual 0 (0), primal 0 (0)
Optimal objective 22000 - 2 iterations time 0.012, Presolve 0.00
Option for printingOptions changed from normal to all
Total time (CPU seconds):       0.04   (Wallclock seconds):       0.04

Optimal
300.0 200.0 22000.0

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$
```

Ex2: (fabrication)

```python
import pulp as p
Lp_prob = p.LpProblem('Problem', p.LpMaximize)
# Create problem Variables
x = p.LpVariable("x", LowBound = 0)   # Create a variable x >= 0
y = p.LpVariable("y", LowBound = 0)   # Create a variable y >= 0

# Objective Function
Lp_prob += 10 * x + 18 * y

# Constraints:
Lp_prob += 2 * x + 3 * y <= 100
Lp_prob += 0.4 * x + 0.6 * y <= 700
```

```
# Display the problem
print(Lp_prob)

status = Lp_prob.solve()   # Solver
print(p.LpStatus[status])   # The solution status

# Printing the final solution
print(p.value(x), p.value(y), p.value(Lp_prob.objective))
```

résultat :

```
Problem MODEL has 2 rows, 2 columns and 4 elements
Coin0008I MODEL read with 0 errors
Option for timeMode changed from cpu to elapsed
Presolve 0 (-2) rows, 0 (-2) columns and 0 (-4) elements
Empty problem - 0 rows, 0 columns and 0 elements
Optimal - objective value 600
After Postsolve, objective 600, infeasibilities - dual 0 (0), primal 0 (0)
Optimal objective 600 - 0 iterations time 0.002, Presolve 0.00
Option for printingOptions changed from normal to all
Total time (CPU seconds):       0.02   (Wallclock seconds):       0.02

Optimal
0.0 33.333333 599.999994
```

Exer 3: (chaise)

```
import pulp as p
Lp_prob = p.LpProblem('Problem', p.LpMaximize)
# Create problem Variables
a = p.LpVariable("a", lowBound = 0)   # Create a variable x >= 0
b = p.LpVariable("b", lowBound = 0)   # Create a variable y >= 0

# Objective Function
Lp_prob += 450 * a + 800 * b

# Constraints:
Lp_prob += 1.5 * a +  2 * b <= 250
Lp_prob += 0.5 * a + 0.75 * b <= 100
Lp_prob += 2 * a + 3 * b <= 300
Lp_prob += a >= 100
Lp_prob += b >= 53
Lp_prob += b <= 99
Lp_prob += a <= 99
```

```
# Display the problem
print(Lp_prob)

status = Lp_prob.solve()   # Solver
print(p.LpStatus[status])   # The solution status

# Printing the final solution
print(p.value(a), p.value(b), p.value(Lp_prob.objective))
```

Résultat :

```
Presolve determined that the problem was infeasible with tolerance of 1e-08
Analysis indicates model infeasible or unbounded
0  Obj -0 Primal inf 153 (2) Dual inf 1250 (2)
0  Obj -0 Primal inf 153 (2) Dual inf 2.0000001e+10 (2)
3  Obj 85150 Primal inf 20 (3)
Primal infeasible - objective value 85150
PrimalInfeasible objective 85150 - 3 iterations time 0.012

Result - Linear relaxation infeasible

Enumerated nodes:          0
Total iterations:          0
Time (CPU seconds):        0.03
Time (Wallclock Seconds):  0.03

Option for printingOptions changed from normal to all
Total time (CPU seconds):        0.04    (Wallclock seconds):        0.04

Infeasible
99.0 50.75 85150.0

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```