4.Solve the following linear program using primal dual method

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In [36]: **from gurobipy import** *

```
# Model
model = Model("prod")
model.setParam(GRB.param.Method, 0)

# Create decision variables
x1 = model.addVar(name="x1") # arguments by name
x2 = model.addVar(name="x2") # arguments by position
x3 = model.addVar(name="x3") # arguments by deafult
x4 = model.addVar(name="x4") # arguments by deafult
x5 = model.addVar(name="x5") # arguments by deafult

# Update model to integrate new variables
model.update()

# The objective is to maximize (this is redundant now, but it will overwri
model.setObjective(5*x1 + 2*x2 + x3 + 4*x4 + 6*x5, GRB.MINIMIZE)

# Add constraints to the model
model.addConstr(3*x1 + 5*x2 - 6*x3 + 2*x4 + 4*x5 ,GRB.EQUAL, 25, "c1")
model.addConstr(x1 + 2*x2 + 3*x3 - 7*x4 + 6*x5 ,GRB.GREATER_EQUAL, 2, "c2'
model.addConstr(9*x1 - 4*x2 + 2*x3 + 5*x4 - 2*x5 ,GRB.EQUAL, 16,  "c3")


# Solve
model.optimize()
data = []
# Let's print the solution
for v in model.getVars():
    print v.varName, v.x
    data.append(v)
```

Changed value of parameter Method to 0
   Prev: -1 Min: -1 Max: 4 Default: -1
Optimize a model with 3 rows, 5 columns and 15 nonzeros

1

```
Coefficient statistics:
  Matrix range     [1e+00, 9e+00]
  Objective range [1e+00, 6e+00]
  Bounds range     [0e+00, 0e+00]
  RHS range        [2e+00, 2e+01]
Presolve time: 0.00s
Presolved: 3 rows, 5 columns, 15 nonzeros

Iteration    Objective        Primal Inf.    Dual Inf.      Time
       0    3.7500000e+01   1.781250e+00   1.031248e+06      0s
       2    2.2000000e+01   0.000000e+00   0.000000e+00      0s

Solved in 2 iterations and 0.01 seconds
Optimal objective  2.200000000e+01
x1 3.15789473684
x2 3.10526315789
x3 0.0
x4 0.0
x5 0.0
```

In [37]: *# Let's print the dual variables*
          for c **in** model.getConstrs():
              print c.constrName, c.pi

```
c1 0.666666666667
c2 0.0
c3 0.333333333333
```

In [38]: data

Out[38]: [<gurobi.Var x1 (value 3.15789473684)>,
          <gurobi.Var x2 (value 3.10526315789)>,
          <gurobi.Var x3 (value 0.0)>,
          <gurobi.Var x4 (value 0.0)>,
          <gurobi.Var x5 (value 0.0)>]