

IDO- Problema del viajero

Marcelino Sánchez Rodríguez 191654

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Problema del viajero

```
using JuMP, HiGHS
model = Model(HiGHS.Optimizer)

M = 4
N = 4

@variable(model, x[1:M, 1:N], Bin)

matrizCostos = [0 2 4 5; 2 0 7 2; 4 7 0 1; 5 2 1 0]

for j in 1:N
    @constraint(model, sum(x[i, j] for i in 1:M) == 1)
end

for i in 1:M
    @constraint(model, sum(x[i, j] for j in 1:N) == 1)
end

for i in 1:M
    @constraint(model, x[i, i] == 0)
end

@objective(model, Min, sum(matrizCostos[i, j] * x[i, j] for i in 1:M, j in 1:N))

optimization_result = optimize!(model)
```

Running HiGHS 1.6.0: Copyright (c) 2023 HiGHS under MIT licence terms

Presolving model
 8 rows, 12 cols, 24 nonzeros
 8 rows, 12 cols, 24 nonzeros
 Objective function is integral with scale 1

Solving MIP model with:

8 rows
 12 cols (12 binary, 0 integer, 0 implied int., 0 continuous)
 24 nonzeros

	Nodes		B&B Tree		Objective Bounds		Dynamic C	
	Proc.	InQueue	Leaves	Expl.	BestBound	BestSol	Gap	Cuts
T	0	0	0	0.00%	0	inf	inf	0
	0	0	0	0.00%	0	6	100.00%	0

Solving report

Status Optimal
 Primal bound 6
 Dual bound 6
 Gap 0% (tolerance: 0.01%)
 Solution status feasible
 6 (objective)
 0 (bound viol.)
 0 (int. viol.)
 0 (row viol.)
 Timing 0.00 (total)
 0.00 (presolve)
 0.00 (postsolve)
 Nodes 1
 LP iterations 5 (total)
 0 (strong br.)
 0 (separation)
 0 (heuristics)

value.(x)

4×4 Matrix{Float64}:

```
0.0  1.0  0.0  0.0
1.0  0.0  0.0 -0.0
0.0  0.0  0.0  1.0
0.0  0.0  1.0  0.0
```

```
solution_summary(model; verbose = true)
```

```
* Solver : HiGHS

* Status
  Result count      : 1
  Termination status : OPTIMAL
  Message from the solver:
  "kH highsModelStatusOptimal"

* Candidate solution (result #1)
  Primal status      : FEASIBLE_POINT
  Dual status        : NO_SOLUTION
  Objective value     : 6.000000e+00
  Objective bound     : 6.000000e+00
  Relative gap        : 0.000000e+00
  Primal solution :
    x[1,1] : 0.000000e+00
    x[1,2] : 1.000000e+00
    x[1,3] : 0.000000e+00
    x[1,4] : 0.000000e+00
    x[2,1] : 1.000000e+00
    x[2,2] : 0.000000e+00
    x[2,3] : 0.000000e+00
    x[2,4] : -0.000000e+00
    x[3,1] : 0.000000e+00
    x[3,2] : 0.000000e+00
    x[3,3] : 0.000000e+00
    x[3,4] : 1.000000e+00
    x[4,1] : 0.000000e+00
    x[4,2] : 0.000000e+00
    x[4,3] : 1.000000e+00
    x[4,4] : 0.000000e+00

* Work counters
  Solve time (sec)   : 4.30954e-03
  Simplex iterations : 5
  Barrier iterations : -1
  Node count         : 1
```