

```

In [1]: #Problem 4-2
using JuMP, Cbc, NamedArrays

activities = [:1, :2, :3, :4, :5, :6]
#label = Dict{zip(activities,[1,2,3,4,5,6])}
duration = Dict{zip(activities, [8,11,6,5,7,5])}
precedences = [(1,3),(2,4),(3,4),(3,5),(4,5),(4,6)]
#reduce = [[1,2,3,4],[1,2,3,4],[1,2,3,4],[1,2,3,4],[1,2,3,4],[1,2,3,4]]
M = 4

m = Model()

@variable(m, x[activities] >=0)
@variable(m, 0 <= reduce[activities] <= 4)
@variable(m, finishtime)
@variable(m, y[activities] >=0, Bin)

@objective(m, Min, (10+4)*sum(x[i] for i in activities))

@constraint(m, minimax[i in activities], finishtime >= x[i] + duration[i] - reduce[i])
@constraint(m, precedence_relationships[(i,j) in precedences], x[j] >= x[i] + duration[i]-reduce[i])
@constraint(m, finishtime <= 18)
@constraint(m, decide[i in activities], reduce[i] <= M*y[i])

#@constraint(m, reduction[i in activities], duration[i] - reduce[i] >= 0)
#@constraint(m, totaltime[i in activities], sum(duration[i] - reduce[i]) <= 18)
#@constraint(m, nonzero[i in activities], reduce[i] >=0)

set_optimizer(m, Cbc.Optimizer)
optimize!(m)

```

Welcome to the CBC MILP Solver
Version: 2.10.8
Build Date: Jan 1 1970

command line - Cbc_C_Interface -solve -quit (default strategy 1)
Continuous objective value is 378 - 0.00 seconds
Cgl0004I processed model has 0 rows, 0 columns (0 integer (0 of which binary)) and 0 elements
Cbc3007W No integer variables - nothing to do
Cuts at root node changed objective from 378 to -1.79769e+308
Probing was tried 0 times and created 0 cuts of which 0 were active after adding rounds of cuts (0.000 seconds)
Gomory was tried 0 times and created 0 cuts of which 0 were active after adding rounds of cuts (0.000 seconds)
Knapsack was tried 0 times and created 0 cuts of which 0 were active after adding rounds of cuts (0.000 seconds)
Clique was tried 0 times and created 0 cuts of which 0 were active after adding rounds of cuts (0.000 seconds)
MixedIntegerRounding2 was tried 0 times and created 0 cuts of which 0 were active after adding rounds of cuts (0.000 seconds)
FlowCover was tried 0 times and created 0 cuts of which 0 were active after adding rounds of cuts (0.000 seconds)
TwoMirCuts was tried 0 times and created 0 cuts of which 0 were active after adding rounds of cuts (0.000 seconds)
ZeroHalf was tried 0 times and created 0 cuts of which 0 were active after adding rounds of cuts (0.000 seconds)

Result - Optimal solution found

| | |
|---------------------------|--------------|
| Objective value: | 378.00000000 |
| Enumerated nodes: | 0 |
| Total iterations: | 0 |
| Time (CPU seconds): | 0.01 |
| Time (Wallclock seconds): | 0.01 |

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|---------------------------|------|----------------------|------|
| Total time (CPU seconds): | 0.01 | (Wallclock seconds): | 0.01 |
|---------------------------|------|----------------------|------|

In []: