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October 1, 2023

[ ]:
```
using JuMP
```

[ ]:
```
using CPLEX
```

[ ]:
```
model=Model(CPLEX.Optimizer)
```

```
A JuMP Model
Feasibility problem with:
Variables: 0
Model mode: AUTOMATIC
CachingOptimizer state: EMPTY_OPTIMIZER
Solver name: CPLEX
```

[ ]:
```
@variable(model, x,lower_bound=0)
```

$$x$$

[ ]:
```
@variable(model, y,lower_bound=0)
```

$$y$$

[ ]:
```
@variable(model, z,lower_bound=0)
```

$$z$$

[ ]:
```
@constraint(model, x+y+z <= 20)
```

$$x + y + z \leq 20$$

[ ]:
```
@constraint(model, 10*x+12*y+8*z<=2000)
```

$$10x + 12y + 8z \leq 2000$$

[ ]:
```
fertilizer_cost=10*(200*x+300*y+100*z)
```

$$2000x + 3000y + 1000z$$

[ ]:
```
labour_cost= 40*(10*x+12*y+8*z)
```

$$400x + 480y + 320z$$

[ ]:
```
selling_price = 20*400*x+15*600*y+25*200*z
```

$$8000x + 9000y + 5000z$$

[ ]:
```
profit=selling_price-fertilizer_cost-labour_cost # Defining profit
```

$$5600x + 5520y + 3680z$$

[ ]:
```
@objective(model,Max,profit)
```

$$5600x + 5520y + 3680z$$

[ ]:
```
@show model
```

```
model = A JuMP Model
Maximization problem with:
Variables: 3
Objective function type: AffExpr
`AffExpr`-in-`MathOptInterface.LessThan{Float64}`: 2 constraints
`VariableRef`-in-`MathOptInterface.GreaterThan{Float64}`: 3 constraints
Model mode: AUTOMATIC
CachingOptimizer state: EMPTY_OPTIMIZER
Solver name: CPLEX
Names registered in the model: x, y, z
```

```
A JuMP Model
Maximization problem with:
Variables: 3
Objective function type: AffExpr
`AffExpr`-in-`MathOptInterface.LessThan{Float64}`: 2 constraints
`VariableRef`-in-`MathOptInterface.GreaterThan{Float64}`: 3 constraints
Model mode: AUTOMATIC
CachingOptimizer state: EMPTY_OPTIMIZER
Solver name: CPLEX
Names registered in the model: x, y, z
```

[ ]:
```
optimize!(model)
```

```
CPLEX Error  3003: Not a mixed-integer problem.
Version identifier: 22.1.1.0 | 2022-11-26 | 9160aff4d
Tried aggregator 1 time.
LP Presolve eliminated 2 rows and 3 columns.
All rows and columns eliminated.
Presolve time = 0.00 sec. (0.00 ticks)
```

[ ]:
```
@show value(x)
```

```
value(x) = 20.0

20.0
```

[ ]:
```
@show value(y)
```

```
value(y) = 0.0

0.0
```

[ ]:
```
@show value(z)
```

```
value(z) = 0.0

0.0
```

[ ]:
```
@show objective_value(model) # Maximum profit
```

```
objective_value(model) = 112000.0

112000.0
```