

### 3) Weedwacker Company's lawn trimmers

The Weedwacker Company manufactures two types of lawn trimmers: an electric model and a gas model. The company has contracted to supply a national discount retail chain with a total of 30,000 electric trimmers and 15,000 gas trimmers. However, Weedwacker's production capability is limited in three departments: production, assembly, and packaging. The following table summarized the hours of processing time available, and the processing time required by each department, for both types of trimmers:

	Hours required per trimmer		Hours Available
	Electric	Gas	
Production	0.2	0.4	10,000
Assembly	0.3	0.5	15,000
Packaging	0.1	0.1	5,000

The company makes its electric trimmer in-house for \$55 and its gas trimmer for \$82/ Alternatively, it can buy electric and gas trimmers from another source for \$67 and \$95, respectively. How many gas and electric trimmers should Weedwacker make and how many should it buy from its competitor in order to fulfill its contract in the least costly manner?

optimization model

Decision variable :

$x_1$  : # company's electric trimmer <units>  
 $x_2$  : # company's gas trimmer <units>  
 $x_3$  : # out source electric trimmer <units>  
 $x_4$  : # out source gas trimmer <units>

Objective function :

$$\text{MIN} : 55x_1 + 82x_2 + 67x_3 + 95x_4$$

Constraints :

$$x_1 + x_3 \geq 30,000 \quad x_i \geq 0 \quad \forall i$$

$$x_2 + x_4 \geq 15,000$$

$$0.2x_1 + 0.4x_2 \leq 10,000$$

$$0.3x_1 + 0.5x_2 \leq 15,000$$

$$0.1x_1 + 0.1x_2 \leq 5,000$$

```
run.run
1  reset;
2  model WeedWacker.mod;
3  data WeedWacker.dat;
4  option solver cplex;
5  solve;
6  display x;
7  display total_cost;
```

```
hw02 ampl run.run
• CPLEX 22.1.2: optimal solution; objective 2945000
3 simplex iterations
x [*] :=
  electric_inHouse 30000
  electric_outsource 0
  gas_inHouse 10000
  gas_outsource 5000
;
total_cost = 2945000
```