**Woodworking Company (Original Scenario)**

A certain new woodworking company manufactures and sells dining room tables and chairs. The owner has assumed that his customers are interested in buying tables and chairs individually rather than having to buy them in pre-defined sets, as is the case with most furniture manufacturers. The owner has established the following general guidelines for the company’s production effort:

* The company’s objective is to **maximize profit** during each production cycle.
* Fabrication of each table requires 4 units of wood and each chair requires 1 unit of wood.
* Fabrication of each table requires 20 units of fabrication labor and each chair requires 12 units of fabrication labor.
* Fabrication of each table requires 2 units of assembly labor and each chair requires 4 units of assembly labor.
* Fabrication of each table requires 12 units of finishing labor and each chair requires 8 units of finishing labor.
* Fabrication of each table requires 1 unit of packaging labor and each chair requires 1 unit of packaging labor.
* Producing partially manufactured (i.e., partially fabricated, assembled, finished and/or packaged) tables and/or chairs is acceptable during any given production period since they can be completed during the subsequent production cycle. However, potential profit for a given **production cycle shall be calculated based only upon the number of complete tables and/or chairs** produced during the production cycle, since partially manufactured tables or chairs cannot be sold.
* The company will earn a potential profit of $250 for each table sold and $65 for each chair sold.
* It is assumed that all complete tables and chairs manufactured during a given production period will also be sold during the same production period.

For the current production cycle, the owner anticipates having 750 units of wood, 5,000 units of fabrication labor, 1,225 units of assembly labor, 3,250 units of finishing labor and 500 units of packaging labor available. Create a linear programming model for the preceding scenario using the Excel Solver method in order to answer the questions 7 through 14.

1. What is the optimal number of tables the company should produce during the current production cycle?
	* 163.25
	* 142.86
	* 121.89
	* 71.11
2. What is the optimal number of chairs the company should produce during the current production cycle?
	* 178.57
	* 191.27
	* 134.96
	* 89.67
3. What is the total amount of profit that the company would earn for producing the optimal number of tables and chairs during the current production cycle (keeping in mind that partially manufactured tables and/or chairs do not contribute to profit earned during the current production cycle)?
	* $58,255
	* $42,135
	* $31,280
	* $47,321
4. Which resources will be fully used in producing the optimal number of tables and chairs?
	* Wood and fabrication labor
	* Fabrication labor and assembly labor
	* Assembly labor
	* Wood and finishing labor
	* Finishing labor
	* None of the above

Shortly after beginning production and sales operations the owner discovers that his assumption regarding customers being interested in buying tables and chairs individually rather than in sets is incorrect. The vast majority of his customers are indicating that they are only interested in purchasing table and chair in sets, with each set consisting of one table and four chairs.

1. Without revising the previously stated general guidelines for the company’s production effort, how many complete table and chair sets can the company assemble from the optimal number of tables and chairs produced during the current production cycle?
	* 36
	* 44
	* 51
	* 64
2. If the company is only able to sell tables and chairs in complete sets during the current production cycle, how many excess tables will the company have left in inventory at the end of the current production cycle?
	* 52.89
	* 44.00
	* 76.34
	* 98.86
3. If the company is only able to sell tables and chairs in complete sets during the current production cycle, how many excess chairs will the company have left in inventory at the end of the current production cycle?
	* 2.57
	* 0.57
	* 11.02
	* 369
4. If the company is only able to sell tables and chairs in complete sets during the current production cycle, what is the total amount of profit that the company would potentially earn (keeping in mind that excess tables or chairs do not contribute to profit earned during the current production cycle)?
	* $40,178
	* $39,970
	* $22,440
	* $28,980

**Woodworking Company (Revised Scenario)**

Revise your linear programming model for the preceding Woodworking Company (Original Scenario)to take into account the following additional general guidelines for production in order to answer questions 15 through 21:

* Tables and chairs shall only be sold in complete sets consisting of one table and four chairs (i.e., tables and chairs may not be sold indivually).
* Profit for a given production period shall be calculated based upon the number of complete table and chair sets produced during the production period. Tables and chairs associated with partial table and chair sets shall not be considered when calculating profit.
* Partially manufactured tables and/or chairs do not contribute to profit earned during a given production cycle.
* The company must manufacture a minimum of 50 complete table and chair sets during any given production cycle in order to satisfy estimated customer demand.
1. Can the company produce the required minimum number of complete table and chair sets during the current production cycle?
	* Yes
	* No
2. What is the optimal number of tables the company should produce during the current production cycle in order to produce the optimal number of complete table and chair sets?
	* 62.25
	* 65.18
	* 68.06
	* 71.11
3. What is the optimal number of chairs the company should produce during the current production cycle in order to produce the optimal number of complete table and chair sets?
	* 287.12
	* 272.22
	* 254.87
	* 244.93
4. What is the total amount of profit that the company will potentially earn for producing the optimal number of complete table and chair sets?
	* $33,890
	* $37,649
	* $34,680
	* $41,136
5. Which resource will be fully used in producing the optimal number of tables and chairs?
	* Wood
	* Fabrication labor
	* Assembly labor
	* Finishing labor
	* Packaging labor
	* None of the above
6. How many excess complete tables would the company have remaining in inventory at the end of the production cycle (assuming the company sells all complete table and chairs sets produced during the production cycle)?
	* 0.81
	* 0.00
	* 1.12
	* 4.29
7. How many excess complete chairs would Willis have remaining in inventory at the end of the production cycle (assuming the company sells all complete table and chairs sets produced during the production cycle)?
	* 0.00
	* 11.29
	* 2.76
	* 7.12