**Nonlinear Programming Problem 58: Solution**

**Model:**

Parameters:

$C\_{i }$*: Cost of each product* $i$*,* $ where i\in \left(console,controller,console\&controller\right)$

$S\_{j }$*: Market size of each customer segment* $j$*, where j* $\in \left(guest users, students,elite members\right)$

$W\_{ij }$*: Price each customer segment j is willing to pay for product, where*

$i\in \left(console,controller,console\&controller\right)$*, j* $\in \left(guest users, students,elite members\right)$

Decisions:

$p\_{i }$: *Selling price for each product* $i$*,* $ where i\in \left(console,controller,console\&controller\right)$

$y\_{ij}$: Whether *customer segment* $j$ buys product $i$*,* $where $

$i\in \left(console,controller,console\&controller\right)$*, j* $\in \left(guest users, students,elite members\right)$

Calculated Parameters:

$u\_{ij}$: *Surplus obtained for product* $i by customer segment j$*, where*

$i\in \left(console,controller,console\&controller\right)$*, j* $\in \left(guest users, students,elite members\right)$

$u\_{ij}$ = $W\_{ij }-$ $p\_{i } for all i and j$

Objective:

*Maximize Profit:* $max\sum\_{ij}^{} $ $y\_{ij}\* S\_{j }\*$ ($p\_{i}-C\_{i})$

Constraints:

$\sum\_{i}^{}y\_{ij}\leq 1 ($1) A customer segment can buy max. of 1 product

$\sum\_{i}^{}y\_{ij}\* u\_{ij}\geq 0 for all j$ (2) Purchase product only if surplus is non-negative

$u\_{ij}\*y\_{ij} \geq u\_{kj}\*y\_{kj }$ - M (1-$y\_{ij}) for all i,k$

 (3) Purchase highest utility

 [M is a large number that helps to enforce logical constraint]

$p\_{i}\geq 0$ (4) Non-negative selling price

 [May be redundant as we are maximizing profit]

$y\_{ij} \in \{0,1\}$ (5) Binary decision

**Optimal Solution:**

The following is the solution obtained from Excel Solver:

A maximum revenue of 60,000$ can be attained by scheduling, choosing and pricing the products as shown below in the worksheet snippet.

