**Group Assignment 3 – Group8 – Solutions Explained**

**1.(5 pt) A company sells one product. At unit price P, demand (in number of units) is Q = 1000−20∗P. The company’s unit variable cost is V C = $20, and total fixed cost is F C = $1000. Profit is Π = (P − V C) ∗ Q − F C Using solver, find the profit maximizing price and the maximum profit.**

**Solution:**

Created a table with the given values or formulae of variables.

Clicked on Data Tab -> Solver

Entered H6 (Profit) in “Set Objective cell”

Selected “Max” radio button

Entered H2 (Price) in “By Changing Variable” cell

Defaults untouched – “Make Unconstrained Variables Non-Negative” and “GRG Nonlinear”

|  |  |
| --- | --- |
| **Maximizing Price** | **$35** |
| **Maximizing Profit** | **$3,500** |

**2.(5 pt) A company sells one product. At unit price P, demand (in number of units) is Q = 100, 000P −2 . The company’s unit variable cost is V C = $20, and total fixed cost is F C = $1000. Using solver, find the profit maximizing price and the maximum profit.**

**Solution:**

Created a table with the given values or formulae of variables.

Clicked on Data Tab -> Solver

Entered H6 (Profit) in “Set Objective cell”

Selected “Max” radio button

Entered H2 (Price) in “By Changing Variable” cell

Defaults untouched – “Make Unconstrained Variables Non-Negative” and “GRG Nonlinear”

|  |  |
| --- | --- |
| **Maximum Price** | **$40.00** |
| **Maximum Profit** | **$250.00** |

**4.(10 pt) Acme Bakery makes five products, cupcake, pound cake, raisin bread, cookie and muffin and is trying to decide how many units of each product to make. It has three limited resources that are used to make these products: • Egg (200 units) • Sugar (120 units) • Butter (150 units) The number of units of each resource needed to make one unit of each product and the profit from a unit of each product are given below. Product (1) Cupcake (2) Pound Cake (3) Raisin Bread (4) Cookie (5) Muffin Egg 10 10 0 5 5 Sugar 5 10 4 5 6.25 Butter 5 7 4 5 2.5 Profit 12 20 6 12 12 Acme wants to maximize profit subject to the constraints imposed by the limits of the three resources. Using Excel Solver, find the number of units of each product to make and the corresponding profit.**

**Solution:**

Since the bakery has to make all five kinds of products, so they at least have to produce 1 piece for each type, denote A for # of cupcake needs to be produced, B for # of pound cake needs to be produced, C for # of raisin bread to be produced, D for # of cookie need to be produced and E for # of muffin to be produced, we have A, B, C, D, E >=1 and must be integer.

Max(profit)=12\*A+20\*B+6\*C+12\*D+12\*E

Constraints: 10\*A+10\*B+5\*D+5\*E <=200

5\*A+10\*B+4\*C+5\*D+6.25\*E<=120

5\*A+7\*B+4\*C+5\*D+2.5\*E<=150

A, B, C, D, E are integer

A, B, C, D, E >=1

The best result after using solver is A=7, B=1, C=2, D=12 and E=1, the profit will be 272 .



