2. The program executive office (PEO) for Army ground vehicle systems is evaluating a proposal to open four possible new product lines. The PEO must make a decision as to which of these four products actually will be produced and at what levels. Therefore, an operations research study has been requested to find the most profitable product mix. A substantial cost is associated with beginning the production of any product, as given in the first row of the following table. Management's objective is to find the product mix that maximizes the total profit (total net revenue minus start-up costs).

	Product			
	1	2	3	4
Start-up Cost	$50,000	$40,000	$70,000	$60,000
Marginal Revenue	$70	$60	$90	$80

Let x_1, x_2, x_3, and x_4 be the production levels of products 1, 2, 3, and 4, respectively. Management has imposed policy constraints on these variables. Please introduce your own binary variables as necessary and formulate the following binary policy constraints:

a. No more than two of the products can be produced. Let y_1, y_2, y_3 and y_4 be the binary variables associated products 1, 2, 3, and 4, respectively.
b. Either product 3 or product 4 can be produced only if either product 1 or product 2 is produced.
c. Use either of the capacity constraints (hint; reformulate the two constraints using the binary variable, z, *and add the additional constraint* $z_1 + z_2 = 1$)

Either $5x_1 + 3x_2 + 6x_3 + 4x_4 \le 6,000$

or $4x_1 + 6x_2 + 3x_3 + 5x_4 \le 6,000$

d. Complete the formulation by writing the complete objective function.
e. Implement your model in Excel and briefly discuss your solution.