ASSIGNMENT 3

Q1.

Decision Variables

X1 and x2 are the 2 decision variables

Objectives

Maximize Z= 4x1+2x2

Functional Constraints

$0.5x2 \leq 5$

$2x1+5x2\leq 60$

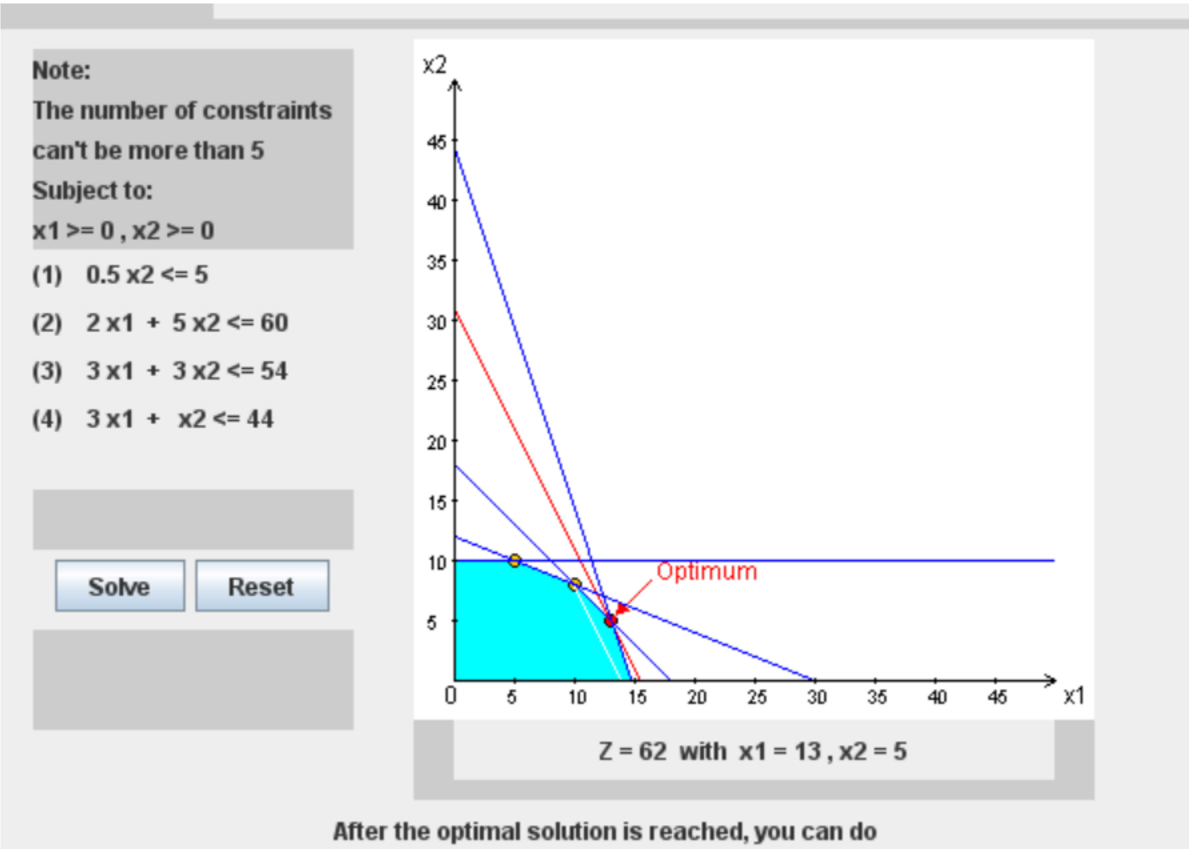
$3x1+3x2\leq 54$

$3x1+x2\leq 44$

Non-Functional Constraints

$X1\geq 0$, $x2\geq 0$

Graphical solution using IOR Tutorial



Exact value of the optimal solution is 62 and Z is maximized at a point where x1=13 and x2=5

Q2. (a)

	WHITT WINDOW COMPANY		
PLANT	PRODUCT		PRODUCTION TIME
	WOOD FRAME	ALLUMINIUM FRAME	
GLASS	3	4	24
WOOD	1	0	6
ALUMINIUM	0	1	4
PROFIT PER UNIT	$150	$75	

<u>Decision Variables</u>

Let the total number of wooden-framed window be x1

Let the total number of alluminium-framed window be x2

<u>Objectives</u>

The profit for each wood-framed and aluminium-framed window is $150 and $75 respectively.

So the total profit which is maximized is

$Z=150x1+75x2$

<u>Functional Constraints</u>

Each wood-framed window requires 3 square feet of glass and each aluminium-framed window Requires 4 square feet of glass

The total glass required is

$3x1+4x2$

But Bob can cut 24 square feet of glass per day,so the inequality is

$3x1+4x2\leq 24$

Dough can make 6 wood frames per day,

$X1\leq 6$

Linda can make 4 aluminium frames per day,

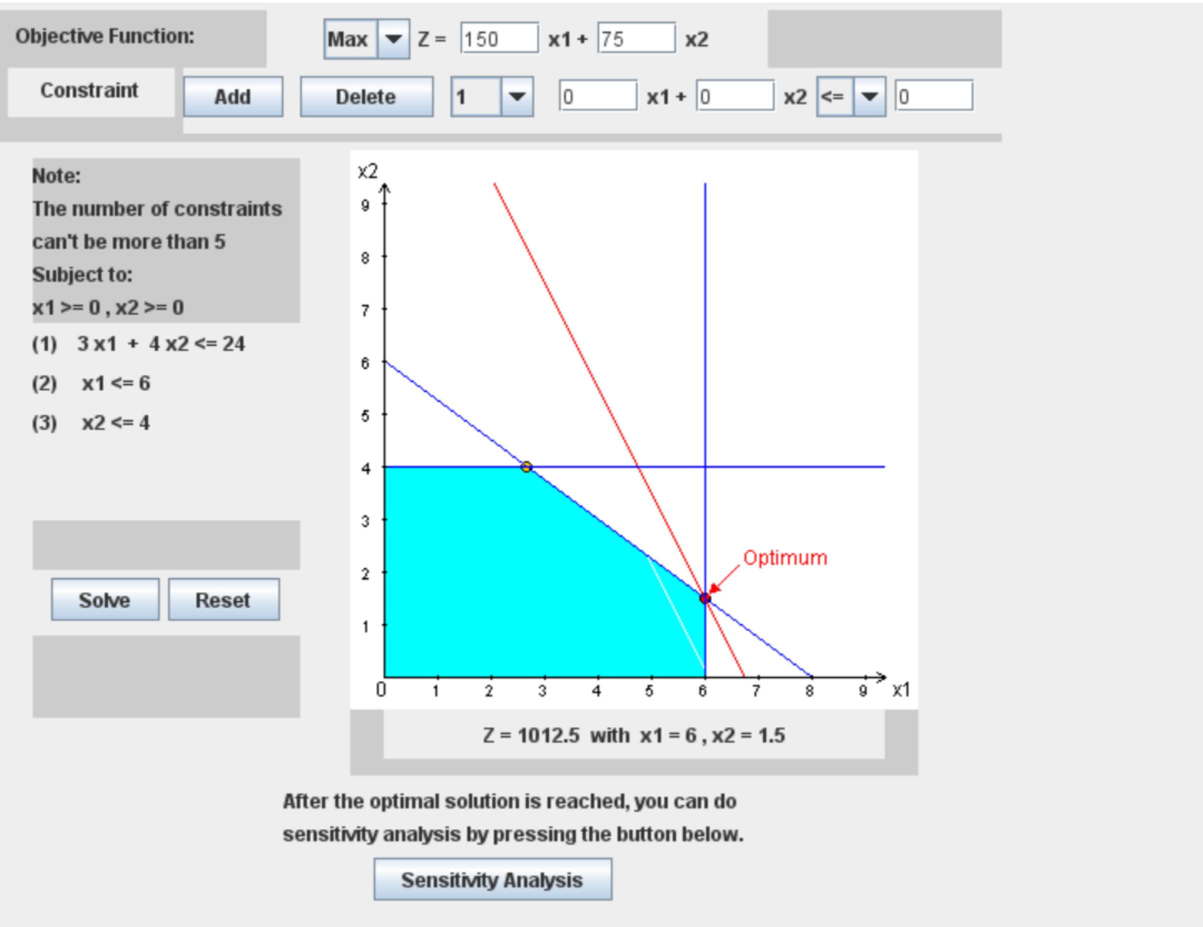
$X2\leq 4$

<u>Non-Functional Constraints</u>

Since the quantity can never be a negative number,we restrict x1 and x2 as non-negative

$X1\geq 0$, $x2\geq 0$

Graphical Solution using IOR Tutorial



Exact value of the optimal solution is 101.2 and Z is maximized at the point when x1=6 and x2=1.5

2(d)

Decision Variables

X1 and x2 are the decision variables

Objectives

Maximize Z= 75x1+75x2

Functional Constraints

3x1+4x2≤ 24

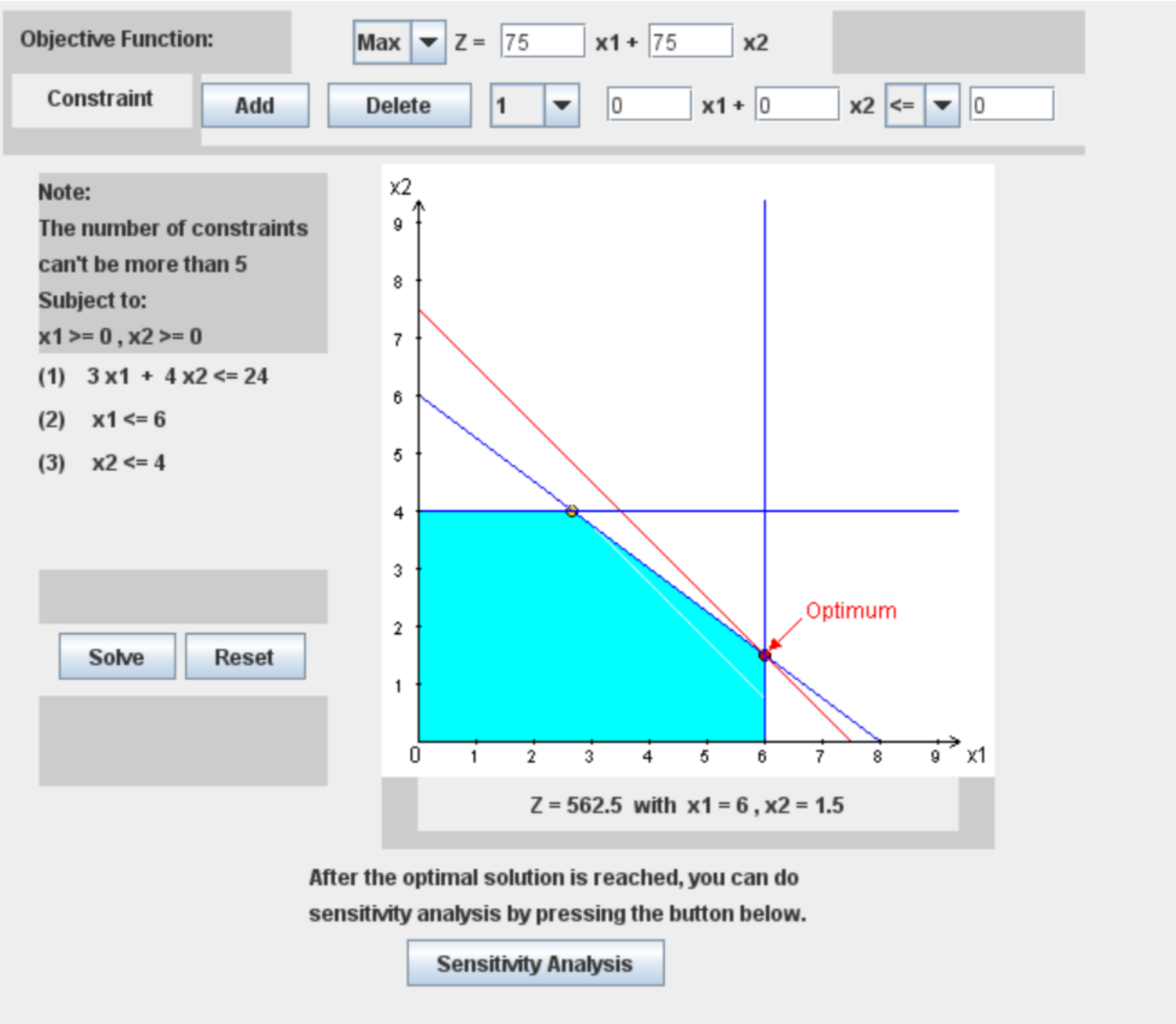
X1≤ 6

X2≤4

Non-Functional Constraints

$X1 \geq 0$, $x2 \geq 0$

Graphical Solution using IOR Tutorial



2(d)

Decision variables

X1 and x2 are the two decision variables

Objectives

Maximize Z= 50x1+75x2

Functional Constraints

$3x1+4x2 \leq 24$

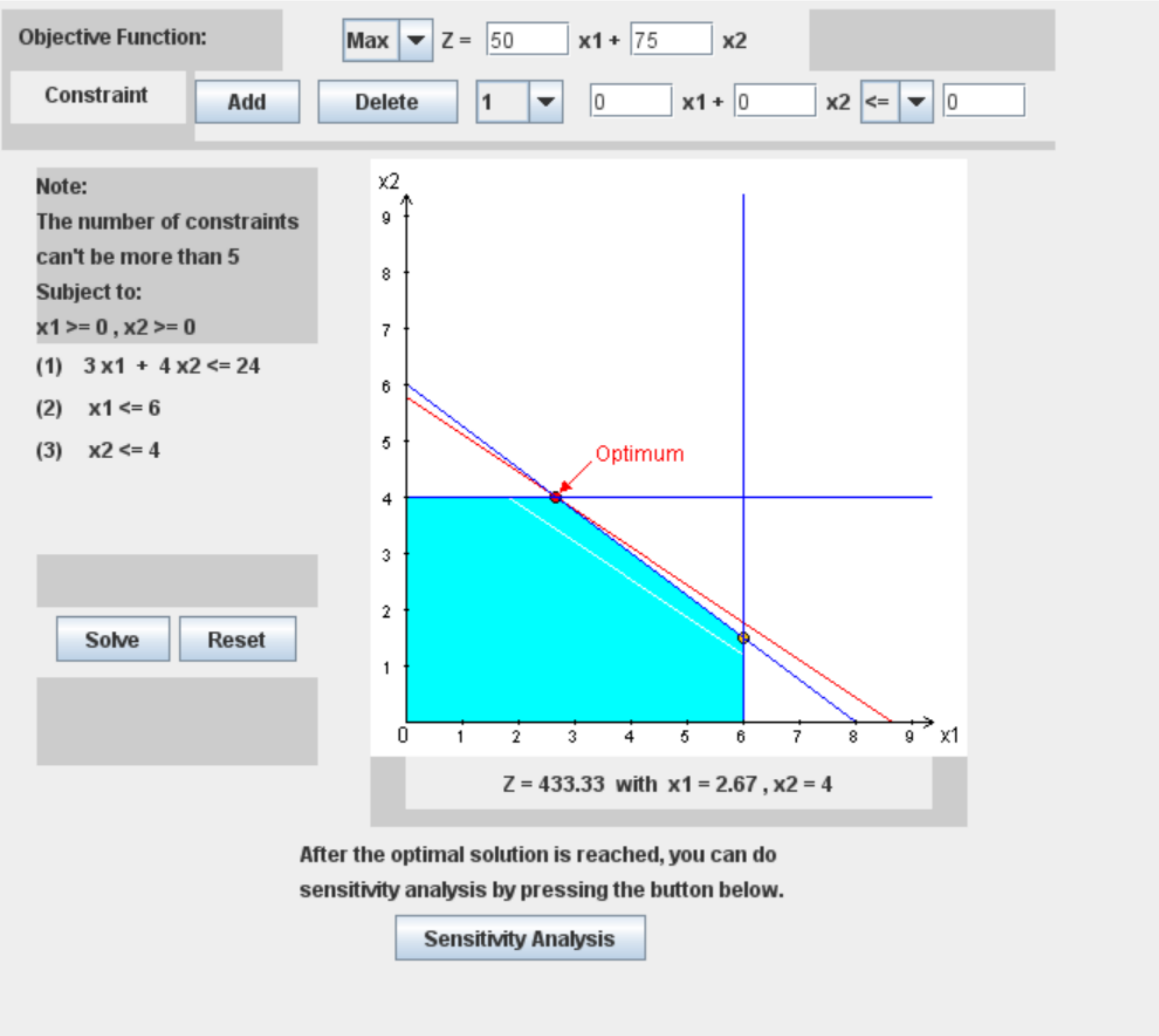
$X1 \leq 6$

$X2 \leq 4$

Non-Functional Constraints

$X1 \geq 0$, $x2 \geq 0$

Graphical Solution using IOR Tutorial



2(e)

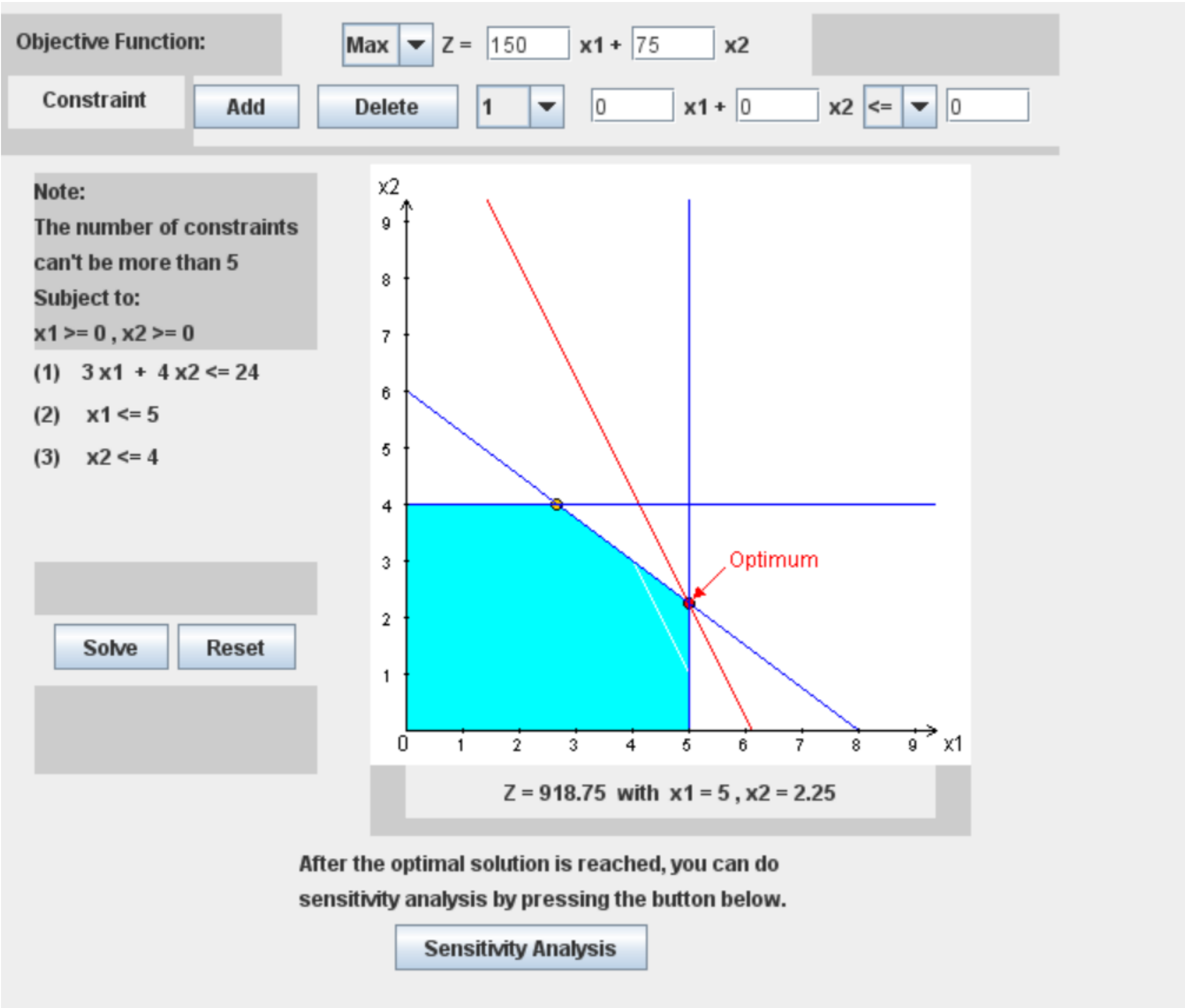
Decision variables
X1 and x2 are the decision variables

Objectives
Maximize Z=150x1+75x2

Functional Constraints
3x1+4x2≤ 24
X1≤ 5
X2≤ 4

Non-Functional Constraints
X1≥ 0, x2≥ 0

Graphical Solution Using IOR Tutorial



Q3.

Decision Variables

X1 is the number of units of product 1 produced

X2 is the number of units of product 2 produced

Objectives

Maximize Z=6x1+4x2

Functional Constraints

$4x1+2x2 \leq 4$

$2x1+4x2 \leq 4$

$6x1+6x2 \leq 8$

Non-Negative Constraints

$X1\geq 0$, $x2\geq 0$

Solving of the Equations

4x1+2x2 = 4

When x1=0 4(0)+2(x2) = 4

0+2(X2) = 4

X2 = 4/2

X2 = 2

x1	0	1
x2	2	0
(x1,x2)	(0,2)	(1,0)

When x2=0 4(x1)+2(0) = 4

4(x1) = 4

X1 = 4/4

X1 = 1

2x1+4x2= 4

When x1=0 2(0)+ 4(x2) =4

0+4(x2) = 4

4(x2) = 4

X2 = 4/4

X2 = 1

x1	0	2
x2	1	0
(x1,x2)	(0,1)	(2,0)

When x2=0 2(x1)+4(0) = 4

2(x1)+0 = 4

2(x1) = 4

X1= 4/2

X1 = 2

6x1+6x2 = 8

When x1=0 6(0)+6(x2) = 8

0 + 6(x2) = 8

6(x2) = 8

X2= 8/6

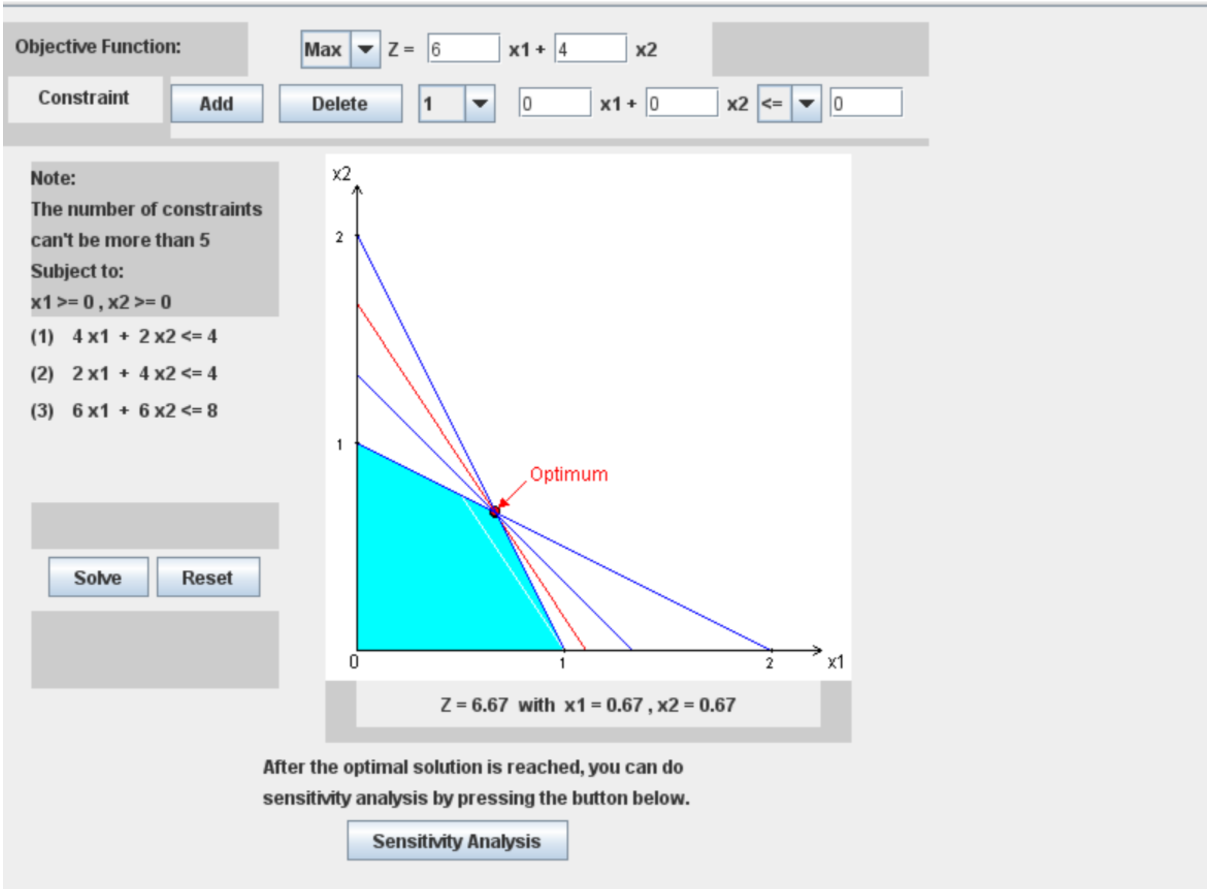
X2 = 4/3

X2 = 1.3

When x2 = 0   6(x1)+6(0) = 8
6(x1)+0 = 8
6(x1)= 8
X1=8/6
X1=4/3
X1=1.3

x1	0	1.3
x2	1.3	0
(x1,x2)	(0,1.3)	(1.3,0)

<u>Graphical solution using IOR Tutorial</u>



Corner points	x1	x2
a	0	1
b	0	0
c	1	0
d	0.67	0.67

Z= 6X1+4X2
a   Z= 6(0) + 4(1) = 4
b   Z= 6(0) + 4(0) = 0
c   Z= 6(1) + 4(0) = 6
d   Z= 6(0.67) + 4(0.67) = 4.02+2.68 = 6.7

Exact value of the optimal solution is 6.7 and Z is maximized at point d where x1=0.67 and x2=0.67