AL GURAIR UNIVERSITY

COLLEGE OF BUSINESS STUDIES

Decision Science BSG 305 Summers 1:- 2012/2013

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Homerwork /1

Due date: - Saturday 21-07-2013

Student Name:- ---------- **ID:-** ----------

Question 1

a) Best alternative

Maximax Criterion

Alternative	State of Nature				
	Growing Market	**Saturation Market**	**Stable Market**	**Declining Market**	**Maximum Profit**
Probability	*0.22*	*0.28*	*0.30*	*0.20*	
V.Large Factory	500,000	350,000	200,000	-550,000	***500,000***
Large Factory	380,000	180,000	90,000	-270,000	380,000
Medium Size Factory	220,000	105,000	70,000	-190,000	220,000
Small Factory	96,000	52,000	33,000	-83,000	96,000

The best alternative under the ***maximax criterion*** is ***very large factory*** because it has the highest payoff of $500,000

Minimax

Alternative	State of Nature				
	Growing Market	**Saturation Market**	**Stable Market**	**Declining Market**	**Maximum Loss**
Probability	0.22	0.28	0.30	0.20	
V.Large Factory	0	0	0	467,000	467,000
Large Factory	120,000	170,000	110,000	187,000	***187,000***
Medium Size Factory	280,000	245,000	130,000	107,000	280,000
Small Factory	404,000	298,000	167,000		404,000

Large factory should be selected since it has the smallest loss.

Minimum regret

To find the best criterion under this criterion, the expected opportunity loss (regret) is computed. The project with the smallest EOL is selected. The best alternative under this criterion is ***Very large factory*** whose EOL is as follows

$$EOL(very\ large\ Factory) = 0.22 \times 0 + 0.28 \times 0 + 0.30 \times 0 + 0.20 \times 467{,}000$$

$= \$93{,}400$

Alternative	State of Nature				
	Growing Market	Saturation Market	Stable Market	Declining Market	EOL
Probability	0.22	0.28	0.30	0.20	
V.Large Factory	0	0	0	467,000	***93,400***
Large Factory	120,000	170,000	110,000	187,000	144,400
Medium Size Factory	280,000	245,000	130,000	107,000	190,600
Small Factory	404,000	298,000	167,000	0	222,420

EVPI

Alternative	State of Nature				
	Growing Market	Saturation Market	Stable Market	Declining Market	EV
Probability	0.22	0.28	0.30	0.20	
V.Large Factory	500,000	350,000	200,000	-550,000	*158,000*
Large Factory	380,000	180,000	90,000	-270,000	107,000
Medium Size Factory	220,000	105,000	70,000	-190,000	60,800
Small Factory	96,000	52,000	33,000	-83,000	28,980
Best Decision	500,000	350,000	200,000	-83,000	251,400.00
				EVPI	93,400.00

$Largest\ EV(Very\ large\ Factory)$

$= 0.22 \times 500{,}000 + 0.28 \times 350{,}000 + 0.30 \times 200{,}000 + 0.20 \times -550{,}000$

$= 158{,}000$

$Expected\ value\ under\ certainity(EVUC)$

$= 0.22 \times 500{,}000 + 0.28 \times 350{,}000 + 0.30 \times 200{,}000 + 0.20 \times -83000$

$= 251{,}400$

$EVPI = EVUC - EV = 251{,}400 - 258{,}000 = 93{,}400$

Question 2

a) Maximization Problem

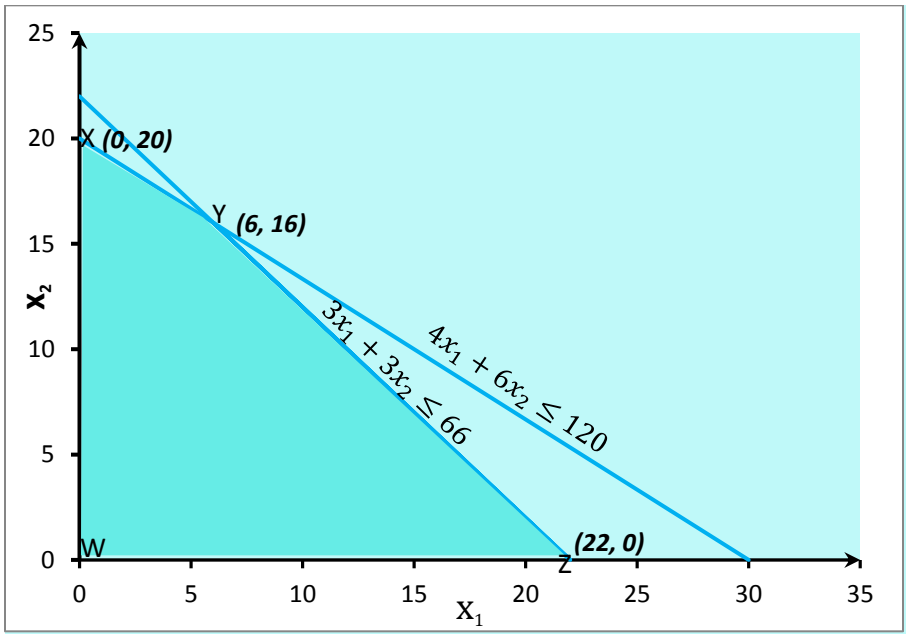
$Maximize: z = 10x_1 + 12x_2$

$Subject\ to: 3x_1 + 3x_2 \leq 66$

$4x_1 + 6x_2 \leq 120,$

$x_1, x_2 \geq 0$

Graphical Solution



Value of Z at corner points

Point	x_1	x_2	$z = 10x_1 + 12x_2$
W	0	0	0
X	0	20	240
Y	***6***	***16***	***252***
Z	22	0	220

Since Y has the maximum value the solution to the LP is

$$x_1 = 6 \; and \; 2 = 16 \; z = 252$$

b) Minimization Problem

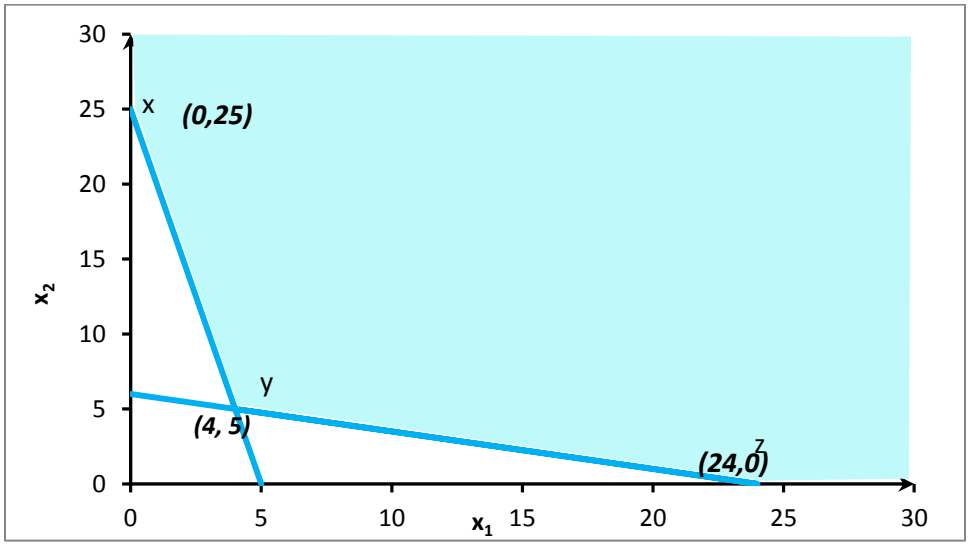
$Minimize: z = 2x_1 + 6x_2$

$Subject\ to: x_1 + 4x_2 \geq 66$

$5x_1 + x_2 \leq 25,$

$x_1, x_2 \geq 0$

Graphical Solution



Values of Z at corner points

	x_1	x_2	$z = 10x_1 + 12x_2$
x	0	25	150
y	***4***	***5***	***38***
z	24	0	48

Point y has the minimum value and therefore the solution to the LP is

$$x_1 = 4, x_2 = 5, z = 38$$