Final Assessment

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Course Name: Industrial And Operational Management.

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Question-01

Here given;

Maximize,

$$Z = x + y$$

Subject to,

$$2x + y \leq 4$$

$$x + 2y \leq 3$$

and, $x, y \geq 0$

Turning the inequalities to equalities;

$$Z - x - y = 0 \quad (0)$$

$$2x + y + P = 4 \quad (1)$$

$$x + 2y + Q = 3 \quad (2)$$

Here, we find 4 different variables and 2 equations except maximize equation. So, the degree of freedom will be (4-2) or 2. Let non Basic variables x and y are equal to zero. $x = 0$, $y = 0$.

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Calculations

$$
\begin{array}{cccccc}
1 & -1 & -1 & 0 & 0 & 0 \\
0 & 1 & 1/2 & 1/2 & 0 & 2 \\
\hline
1 & 0 & -\frac{1}{2} & 1/2 & 0 & 2
\end{array}
$$

$$
\begin{array}{cccccc}
0 & 1 & 2 & 0 & 1 & 3 \\
0 & -1 & -1/2 & -1/2 & 0 & -2 \\
\hline
0 & 0 & 3/2 & -1/2 & 1 & 1
\end{array}
$$

$$
\begin{array}{cccccc}
0 & 0 & 1/2 & 1/2 & 0 & 2 \\
0 & 0 & -1/2 & 1/6 & -1/3 & -1/3 \\
\hline
0 & 0 & 0 & 2/3 & -1/3 & 5/3
\end{array}
$$

$$
\begin{array}{cccccc}
1 & 0 & -1/2 & 1/2 & 0 & 2 \\
0 & 0 & \frac{1}{2} & -1/6 & 1/3 & 1/3 \\
\hline
1 & 0 & 0 & 1/3 & 1/3 & 7/3
\end{array}
$$

Basic variables	Eq.	Coefficient of;					Right side	Ratio
		z	x	y	p	q		
z	(0)	1	(-1)	-1	0	0	0	
p	(1)	0	2	1	1	0	4	$4 \to 4/2 \to (2)$
q	(2)	0	1	2	0	1	3	$3 \to 3/1 \to 3$
z	(0)	1	0	$(-1/2)$	$1/2$	0	2	
x	(1)	0	1	$1/2$	$1/2$	0	2	$2 \to \frac{2}{1/2} \to 4$
q	(2)	0	0	$3/2$	$-1/2$	1	1	$1 \to 1/3/2 \to \frac{2}{3} = (0.67)$
z	(0)	1	0	0	$1/3$	$1/3$	$(7/3)$	$\to z$
x	(1)	0	0	0	$2/3$	$-1/3$	$5/3$	$\to x$
y	(2)	0	0	1	$-1/3$	$2/3$	$2/3$	$\to y$

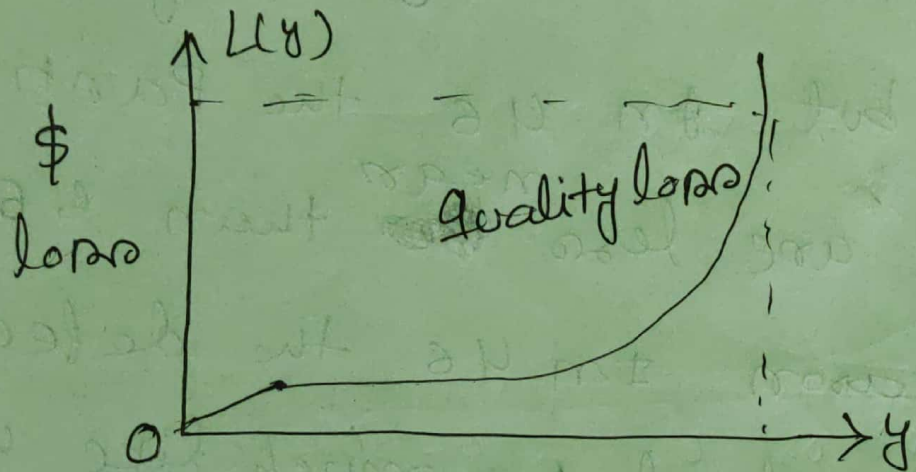
So, Maximize, $Z = 7/3$

And, $(x, y) = (5/3, \frac{2}{3})$

(Result)

Question - 02

① Laptops overheats :- In this case we can say smaller is better can be used.



Here, Some characteristics can never take negative values, also their ideal value always zero and as their value increases the performance becomes progressively worse, when $m=0$; In that case smaller is better.

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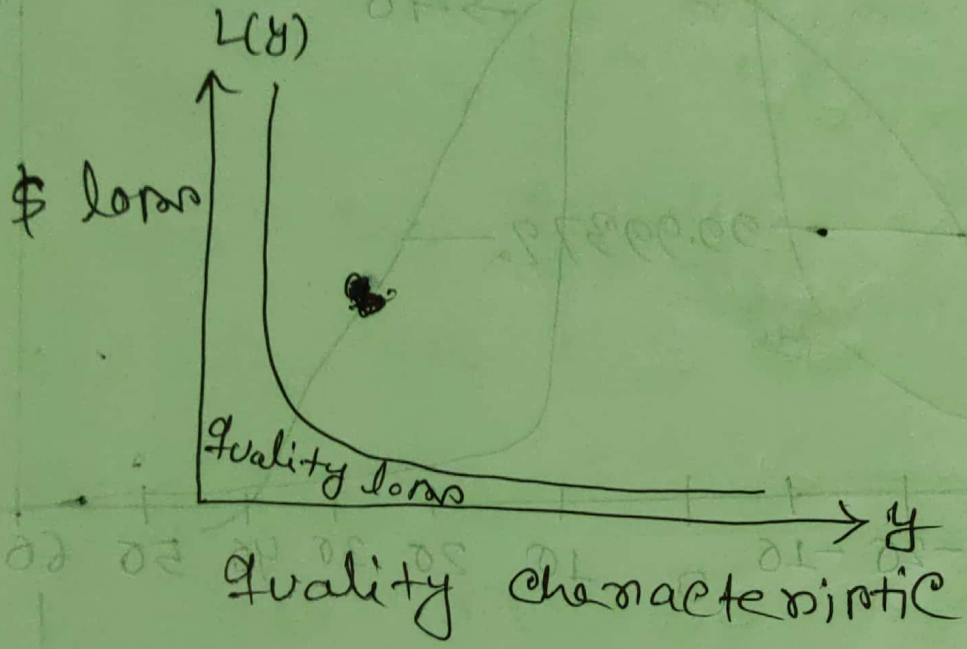
(2) Battery life:- In this case, larger is better can be used.



In this case the goal of experiment is maximize the reponse and its data characteristics are always positive. And for this reason here Larger is better because it is always used to get maximum response.

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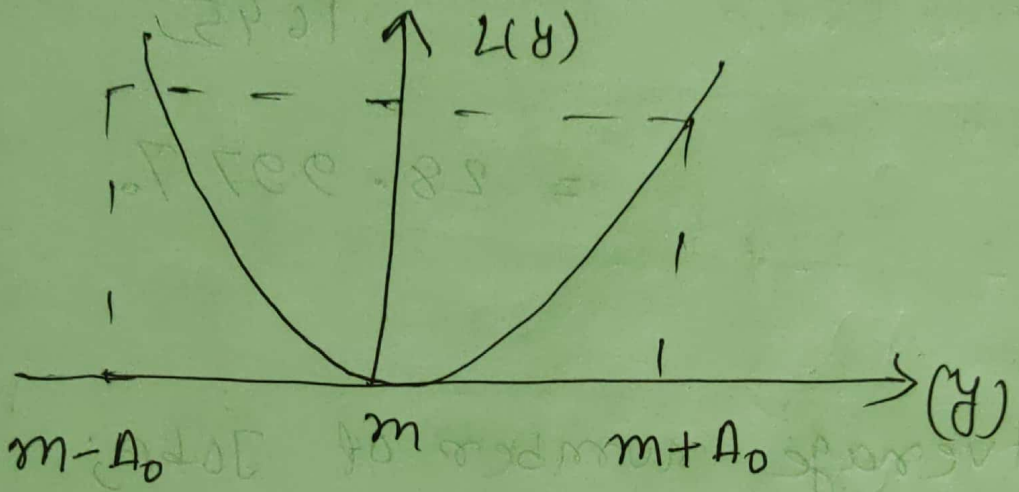
(3) Ram issue: In this we can say we will use nominal is best.



Nomit-the-best

When the quality characteristic y has a finite target value, usually non zero, and the quality loss is symmetric on the either side of the target, such quality characteristics called nominal-the-best type. So, In ram issue we can use nominal the best for reducing losses.

Question -04

Job	Processing time	Due date	CR 01	CR 02	CR 03	CR 04	CR 05
C	63	99	$(99-0)/63 = 1.57$	$\frac{(99-120)}{63} = -0.33$	✓	✓	✓
A	21	114	$(114-0)/21 = 5.43$	$\frac{(114-120)}{21} = -0.29$	$\frac{114-183}{21} = -3.29$	✓	✓
B	89	153	$(153-0)/89 = 1.72$	$\frac{153-120}{89} = 0.37$	$\frac{153-183}{89} = -0.34$	$\frac{153-204}{89} = -0.57$	✓
E	120	168	$(168-0)/120 = 1.4$	✓	✓	✓	✓
D	109	192	$(192-0)/109 = 1.76$	$\frac{192-120}{109} = 0.66$	$\frac{192-183}{109} = 0.08$	$\frac{192-204}{109} = -0.11$	$\frac{192-293}{109} = -0.93$
F	75	210	$(210-0)/75 = 2.8$	$\frac{210-120}{75} = 1.2$	$\frac{210-183}{75} = 0.36$	$\frac{210-204}{75} = 0.08$	$\frac{210-293}{75} = -1.11$ ✓

Sequence:

E – C – A – B – F – D

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Job	Processing time	Due Date	Flow time	Job lateness
E	120	168	120	0
C	63	99	183	84
A	21	114	204	90
B	89	153	293	140
F	75	210	368	158
D	109	192	477	285
	477		1645	757

(1) Average completion time;

$$\frac{\text{Total flow time}}{\text{number of jobs}} = \frac{1645}{6}$$

$$= 274.17.$$

(2) utilization = $\frac{\text{Total Processing time}}{\text{Total flow time}}$

$= \frac{477}{1645}$

$= 28.997\%$

(3) Average number of Jobs;

$\frac{\text{Total flow time}}{\text{Total Processing time}} = \frac{1645}{477}$

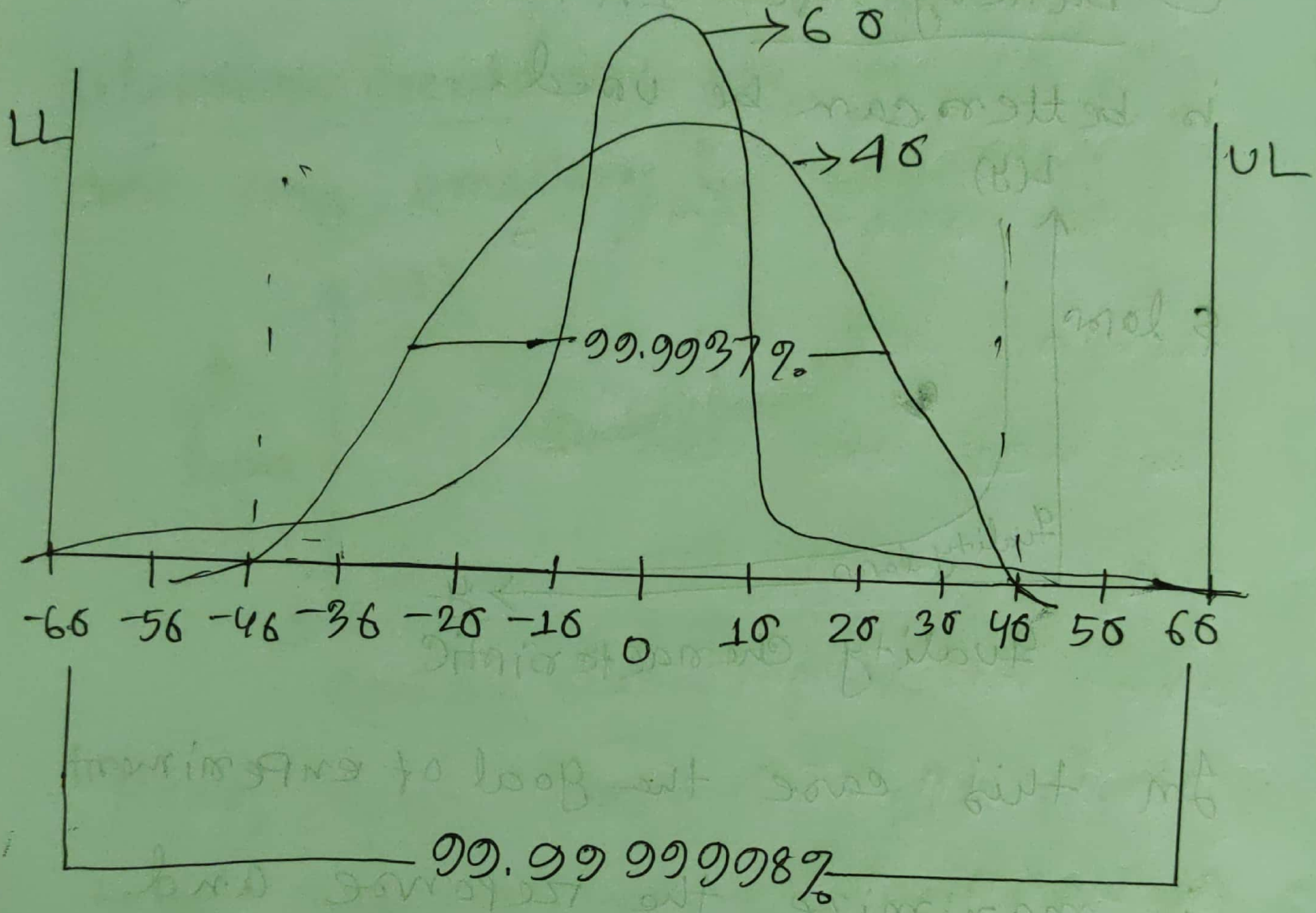
$= 3.45.$

(4) Average Job lateness;

$\frac{\text{Total lateness}}{\text{number of Jobs}} = \frac{757}{6}$

$= 126.17$ units.

Question - 03



Here, +/- 4σ's detective rate 63 ppm. per million.
and +/- 6σ's detective rate 0.002 ppm. per million.

6σ is a tools for process to improvement and it can be done by a set of techniques. And it improves the quality

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of the outputs by finding defects and minimize variability most. On the other hand, 4G doing same things but in 4G the particles distance are less near than 6G. For this reason in 4G the defects are not found so much like we find in 6G. For this reason Between 6G and 4G, 6G reduces variabity more and as it can reduces the variabity more, the cost of 6G is more than 4G. Because in same defferences, we have to put more particals in 6G, so the cost of 6G is more that 4G. and 4G have less variability and cost.