

Samuel Brito

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Computer Engineering

Reliability and Maintainability 600 512

Question A

Linear programming is a method to achieve the best outcome (such as maximum profit or lowest cost) in a mathematical model whose requirements are represented by linear relationships. Linear programming is a special case of mathematical programming also called mathematical optimization.

Engineers also use linear programming to help solve design and manufacturing problems. Linear programming provides engineers with an essential tool in shape optimization.

Question B

Sources: 1 bitenge
1512mp21029
Computer Engineering
coe 312 Reliability and maintainability

$$V = 30x_1 + 20x_2 \quad \text{Objective function}$$

$$\begin{aligned} 2x_1 + x_2 &\leq 1000 \\ x_1 + x_2 &\leq 800 \end{aligned} \quad \text{Constraint}$$

$$\text{where } x_1 \geq 0, x_2 \geq 0$$

applying simplex method

R_1	2	1	1	0	1000	S_1	500
R_2	1	1	0	1	800	S_2	800
R_3	-30	-20	0	0	0		

Divide R_1 through by 2.

	x_1	x_2	S_1	S_2	b	
R_1	1	$\frac{1}{2}$	$\frac{1}{2}$	0	500	x_1
R_2	1	1	0	1	800	S_2
R_3	-30	-20	0	0	0	

$$-R_1 + R_2 \rightarrow R_2$$

$$30R_1 + R_3 \rightarrow R_3$$

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	x_1	x_2	s_1	s_2	b	
R_1	1	$\frac{1}{2}$	$\frac{1}{2}$	0	500	OC_1
R_2	0	$\frac{1}{2}$	$-\frac{1}{2}$	1	300	s_2
R_3	0	-5	15	0	15000	

Divide R_2 through by $\frac{1}{2}$

	x_1	x_2	s_1	s_2	b	
R_1	1	$\frac{1}{2}$	$\frac{1}{2}$	0	500	x_1
R_2	0	1	-1	2	600	OC_2
R_3	0	-5	15	0	15000	

$$-\frac{1}{2} R_2 + R_1 \rightarrow R_1$$

$$2R_2 + R_3 \rightarrow R_3$$

	x_1	x_2	s_1	s_2	b	
R_1	1	0	1	-1	200	OC_1
R_2	0	1	-1	2	600	OC_2
R_3	0	0	10	10	18000	

Maximum Value = 18000 hrs

To maximize contribution margin total working hours = 18,000

$$x_1 = 10 \quad x_2 = 10$$