



OBJECTIVE FUNCTION AND CONSTRAINT DESIGN

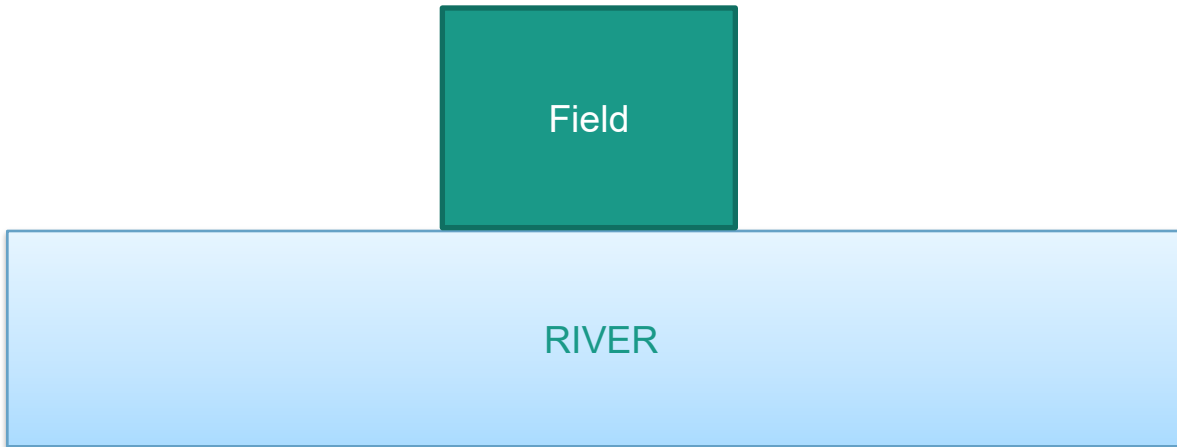
EXAMPLES

Encode the objective or cost function.

Example1:

Farmer has to put 2400 m of fencing. They want to face off rectangle field which borders a straight river. No fencing is needed along with river.

Design Objective Function and Constraint function for the above problem statement. Solve this using optimization algorithm to reduce cost of material used.



Encode the objective or cost function.

Example1:

Three Farmer has to put 2400 m of fencing of a field. They want to face off rectangle field which borders a straight river. No fencing is needed along with river.

Design Objective Function and Constraint function for the above problem statement. Solve this using optimization algorithm to reduce cost of material used.

Area of rectangular region

Objective Function

$$f(x,y) \Rightarrow \min (lb) \quad \text{Quadratic Objective Function}$$

Constraint => Perimeter should not be exceeded by 2400 m.

$$l + 2b \leq 2400 \quad (\text{equality/ inequality}) \quad \text{Linear Constraint}$$

Encode the objective or cost function.

Example2: A farm uses atleast 800 kg of special feed daily. Special feed is mixture of corn and soyabean. Dietary requirement of special feed are atleast 30% protein and 5% fiber. Determine the daily minimum cost of feed.

Objective Function $f(X_1, X_2) = \min(Z) = 0.3 \cdot X_1 + 0.9 \cdot X_2$

Constraint function	$X_1 + X_2 \geq 800$	Daily demand Protein Intake Intake
	$0.09 \cdot X_1 + 0.6 \cdot X_2 \geq 0.3$	
	$0.02 \cdot X_1 + 0.06 \cdot X_2 \leq 0.05$	

	Per Kg.		Cost/kg (in \$)
	Protein	Fiber	
Corn (X1)	0.09	0.02	0.3
Soya bean(X2)	0.6	0.06	0.9
	Atleast 30%	Atmost 5%	

Encode the objective or cost function.

Example3: Asian Paint company produces interior and exterior paints from raw material Material1 and Material 2.

- Daily demand for interior paint can't exceed that of exterior paint by more than 1 unit
- Daily demand for interior paint is 2 unit

Determine optimum quantity of interior and exterior paint that company should get maximum profit daily

	Exterior Paint/ unit	Interior Paint/unit	Availability/ unit
Material 1	6	4	24
Material 2	1	2	6
Profit	\$5	\$4	

Encode the objective or cost function.

Example3: Asian Paint company produces interior and exterior paints from raw material Material1 and Material 2.

- **Daily demand for interior paint can't exceed that of exterior paint by more than 1 unit**
- **Daily demand for interior paint is max 2 unit**

Determine optimum quantity of interior and exterior paint that company should get maximum profit daily

M1= units of **exterior paint** produced daily
 M2= units of **interior paint** produced daily

Objective Function=> $f(M1,M2)= \text{Max}(z)= 5M1+4M2$

s.t. $6M1+4M2 \leq 24$ Constarin1 for material 1
 $M1+2M2 \leq 6$ Constarin2 for material 2
 $M2 \leq M1+1$ $M2 \leq 2$ additional contarint, $M1, M2 \geq 0$

	Exterior Paint/ unit	Interior Paint/unit	Availability / unit
Material 1	6	4	24
Material 2	1	2	6
Profit	\$5	\$4	

