CO 370

Deterministic Operations Research Models

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1. Blending problem

We are buying 3 types of crude oil, each with given

- octane level,
- sulfur levels,
- price, and
- limited supply.

We are **selling** 2 types of refined **gas** produced by blending our 3 types of crude oil. Each type of gas

- must attain prescribed minimum octane level,
- must not exceed prescribed maximum sulfur level,
- has a fixed price, and
- must at least satisfy a given demand.

Determine a way to maximize profits.

1. Blending problem: data

Buy Crude 1, Crude 2, Crude 3 \longrightarrow Sell Gas 1, Gas 2

	octan	e sulfı	ır co	st purchase				
	(AK) (ppm	i) (\$/barre	el) (barrels)				
Crude 1	L 8	0 2	0 6	$50 \le 5000$				
Crude 2	2 9	0 1	0 8	$35 \leq 5000$				
Crude 3	3 9	8	5 12	$20 \le 5000$				
\downarrow								
	octane	sulfur	revenue	production				
(AKI)		(ppm)	(\$/barrel)	(barrels)				
Gas 1	≥ 87	≤ 15	120	≥ 8000				
Gas 2	≥ 91	≤ 9	140	≥ 4000				

Maximize profits.

2. Multiperiod problem

Initial cash: \$ 100,000

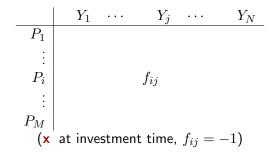
	Y	'1	Y2	Y3	Y4		
Α	x	0.5	1		-		
В		x	0.5]	L		
A B C D E	x	1.2	-		-		
D	x	-	-	1.9)		
Е			x	1.5	5		
(x = investment time)							

Max investment: **\$ 75,000** per project Bank account: **8%** interest per year

Maximize cash at Y4. How much to invest in each project?

3. Multiperiod problem (generic)

Initial cash: \$ K



Max investment: **\$ U** per project Bank account: interest rate **R**, per year

Maximize cash at Y_N . How much to invest in each project?