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SHELL OIL PRODUCTION PROCESS PROBLEM

PROBLEM FORMULATION

DECISION VARIABLE:-

Crude1- barrel of crude1 purchased
Crude2- barrel of crude2 purchased
Gas1- Barrels of gas 1 available to sell
Gas2- Barrels of gas 2 available to sell
Gas3- Barrels of gas 3 available to sell
Process1 - Number of hours process1 is run
Process2 - Number of hours process2 is run
Process3 - Number of hours process3 is run

OBJECTIVE FUNCTION:-

Maximize Profit = 9*Gas1+ 10*Gas2+24*Gas3- 5*Process1- 4*Process2- Process3- 2*Crude1 -3*Crude2

CONSTRAINTS:-

Crude1 $\leq$ 200 {*Maximum available barrels of crude 1 per week*.}
Crude2 $\leq$ 300 {*Maximum available barrels of crude 2 per week.}*
Process1+ Process2+ Process3 $\leq$ 100 {*Maximum available hours for process in catalytic cracker}*
Crude1 $\geq$ 2* Process1 + Process2 {*Amount of crude 1 to run the process}*
Crude2 $\geq$ 3* Process1 + 3* Process2 +2*Process3 { *Amount of crude 2 to run the process}*
Gas1 =2* Process1 {*Total barrel of gas1 to sell}*
Gas2= 1* Process1+ 3* Process2 -3* Process3 {*Total barrel of gas2 to sell}*
Gas3 =2* Process3 {*Total barrel of gas3 to sell}*

Crude1, Crude2, Gas1, Gas2, Gas3, Process1, Process2, Process3 $\geq$ 0 {Non Negativity Constraint}

//The commented PYOMO model is attached

OPTIMAL SOLUTION & INTERPRETATION.

Crude1- barrel of crude1 purchased = 100
Crude2- barrel of crude2 purchased =300
Gas1- Barrels of gas 1 available to sell=0
Gas2- Barrels of gas 2 available to sell =300
Gas3- Barrels of gas 3 available to sell=0
Process1 - Number of hours process1 is run =0
Process2 - Number of hours process2 is run =100
Process3 - Number of hours process3 is run =0

Maximized Profit is $1499.99.

The LP solution for this problem shows that Shell oil company need to run only process 2 for 100 hrs. in a week by shutting down process 1 &2 to maximize the profit to $ 1500 approx. The company is only producing gas 2 (300 barrels) by consuming crude oil1 (100 barrel) and crude oil 2(300 barrel).