CM3450
Fall 2008
Drill 3

1. **Linear Programming using Excel**
   (based on H. Adidharma and V. Temyanko, p.99)

   Given five types of crude oil with products of the following composition:

	Gasoline	Heating Oil	Jet Fuel	Lube Oil
Crude 1	60%	20%	10%	0%
Crude 2	50%	20%	20%	0%
Crude 3	30%	30%	30%	0%
Crude 4	40%	30%	20%	0%
Crude 5	40%	10%	20%	20%
Price	$105/bbl	$95/bbl	$61/bbl	$140
Max Weekly Demand	170,000 bbl	85,000 bbl	75,000 bbl	30,000 bbl

	Cost ($/bbl)	Operating Cost ($/bbl)	Availability (bbl/week)
Crude 1	45	12	80,000
Crude 2	43	20	100,000
Crude 3	40	17	100,000
Crude 4	52	7.50	100,000
Crude 5	65	6.50	65,000

Problem: Find the weekly production of each crude to maximize profit per week.

Solution:

1. Set up the spreadsheet as in Figure 1.

	A	B	C	D	E	F	G	H	I	J	K	L	M	N
1		Composition							bbl/wk		Max Avail	Cost/bbl	O Cost/bbl	Cost/Wk
2	Gasoline	0.6	0.5	0.3	0.4	0.4		Crude 1			80000	45	12	0
3	Heat Oil	0.2	0.2	0.3	0.3	0.1		Crude 2			100000	43	20	0
4	Jet Fuel	0.1	0.2	0.3	0.2	0.2		Crude 3			100000	40	17	0
5	Lube Oil	0	0	0	0	0.2		Crude 4			100000	52	7.5	0
6								Crude 5			60000	65	6.5	0
8												Total Cost/Wk		0
10									bbl/wk		Mx Demand		Price/bbl	$/Wk
11								Gasoline			170000		105	0
12								Heat Oil			85000		95	0
13								Jet Fuel			75000		61	0
14								Lube Oil			30000		140	0
16													Total $/Wk	0
17														
18													Profit/Wk	0

Figure 1. Setup for Crude Oil optimization.

2. Name the matrices:
   a) **B2:F5** as **Comp**
   b) **I2:I6** as **Crude**
   c) **K2:K6** as **MaxAvail**
   d) **I11:I14** as **Products**
   e) **K11:K1**4 as **MaxDemand**
   f) N18 as **Profit**

3. Fill in the necessary formula: both normal formulas and matrix formulas

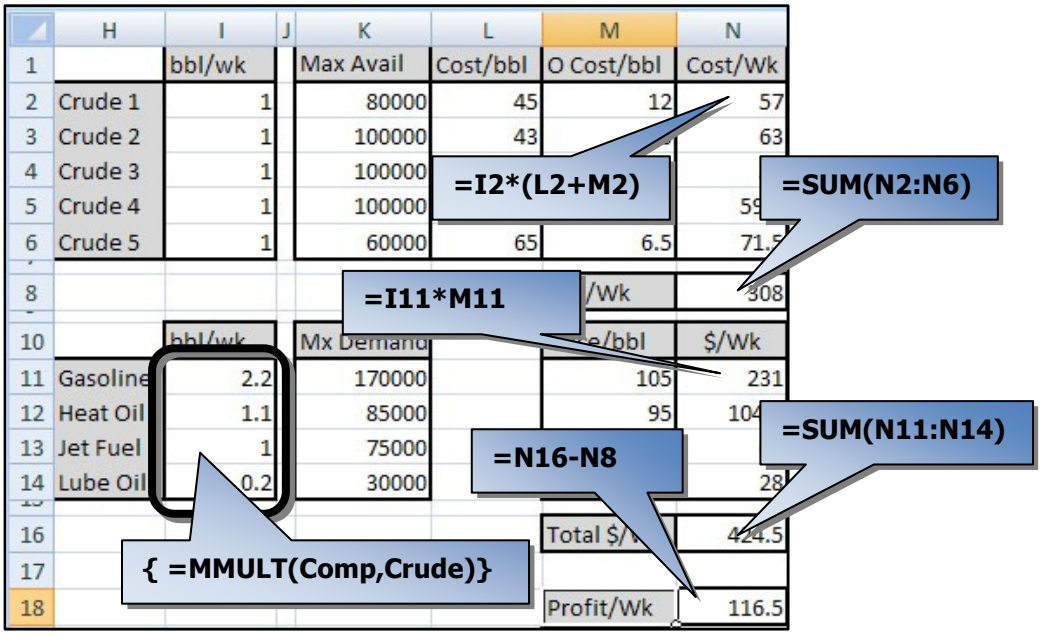

Figure 2. Fill in the formulas

4. Use SOLVER to maximize Profit.

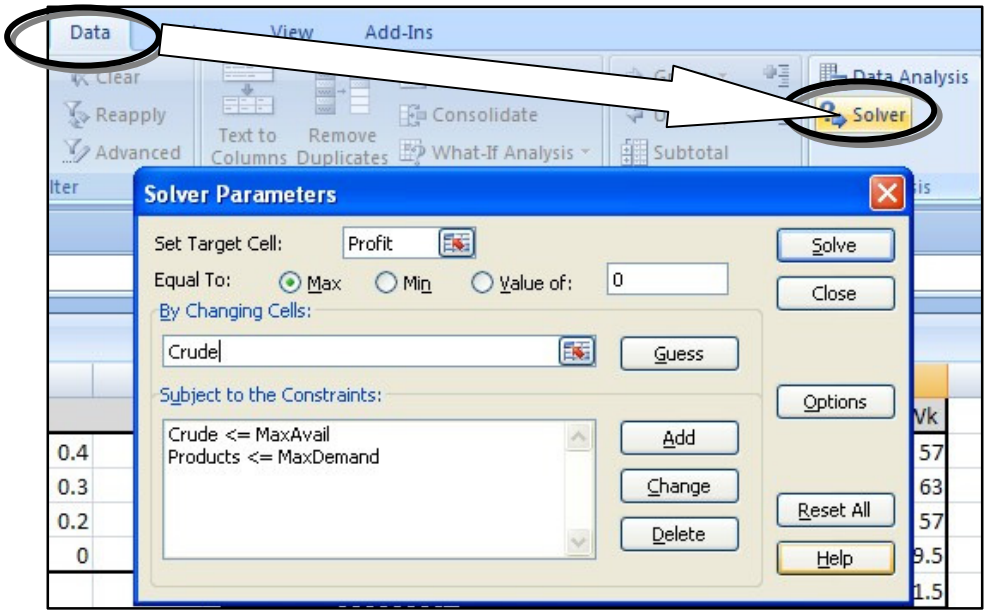

Figure 3. Implement SOLVER.