TOPIC A

Data

Company: Auto-Motor

- Import 20,000,000 tons of aluminum
- Cost: 23 € / ton
- Total import cost: 460,000,000 €

Revenue 600,000,000 €

- 50% chance of import approval
- If not received: fine 2.5 € / ton
- Total cost of the fine 50.000.000 €
- CEO's estimation: half of the applications are rejected

Decision options

- Direct purchase of ore and wait for approval
- Submit application and purchase if approved
- 70% of the purchase agreement lost by a competitor
- Hire advisors for estimating the approval
- Deal with General Motors

Consulting

		Approval	Rejection
		S1	S2
Positive	E1	0.9	0.4
Negative	E2	0.1	0.6

E1: Positive Report
E2: Negative Report

S1: Approval
S2: Rejection

Calculation of odds

P (S1) = 0, 5
P (S2) = 0.5

P (E1 / S1) = 0.9 P (E2 / S1) = 0.1
P (E1 / S2) = 0.4 P (E2 / S2) = 0.6

P (E1) = P (E1 / S1) * P (S1) + P (E1 / S2) * P (S2) = 0.65
P (E2) = P (E2 / S1) * P (S2) + P (E2 / S2) * P (S2) = 0.35

P (S1 | E1) = 0.69
P (S2 | E1) = 0.31
P (S1 | E2) = 0,14
P (S2 | E2) = 0,86

General Motors
Licensing 90%

- Cost:
- 1000 passenger cars cost 5500 € / piece
- 5% of profits

Non-licensing

- compensation 10.000.000 €
- 45% chance to sell aluminum 4 € / ton
- profit 80.000.000 €

Problem solving

➔ Decision tree

Profit: 115.947.500 €

TOPIC B

Data
Dj: demand for each warehouse, where j = 1, .., 4

Decision Variables
Xj: cars transported from factory 1 to warehouse j
Yj: project 2 ->
Tj: project 3 -> warehouse j
Sj: cars staying stock in stock j

/ * Objective Function * /
max: 2000 + 5S1 + 5S2 + 5S3 + 5S4-1.5X1-1.8X2-1.9X3-1.3X4-2.1Y1-1.4Y2-1.5Y3-1.7Y4-2
.5T1- 1.2T2-1.7T3-2.2T4;

/ * Constraints * /
X1 + Y1 + T1-S1 = 300;
X2 + Y2 + T2-S2 = 600;
X3 + Y3 + T3-S3 = 200;
X4 + Y4 + T4-S4 = 400;

X1 + X2 + X3 + X4 = 500;
Y1 + Y2 + Y3 + Y4 = 750;
T1 + T2 + T3 + T4 = 700;

Optimal program

	1,570,000	1	Warehouse	4
Warehouse	300 300	-	-	200
Warehouse 2	-	350	200	200
Warehouse 3	-	700	-	-
stock	-	450	-	-

```
Value of objective function: 1570.00000000

Actual values of the variables:
S1                                0
S2                              450
S3                                0
S4                                0
X1                              300
X2                                0
X3                                0
X4                              200
Y1                                0
Y2                              350
Y3                              200
Y4                              200
T1                                0
T2                              700
T3                                0
T4                                0
```

Profit: 1.570.000