Exercises sheet A1
School of Mathematics
The University of Edinburgh
Year: 2023/2024

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SmeltCo ltd is a company that produces metal alloys. The alloys they produce are bronze, brass and duralumin. In order for them to produce an alloy they are required to blend two different raw materials, for example in order to produce bronze SmeltCo ltd must blend copper and in together. The blends for each alloy are provided in the table below.

Brass	Copper	Zinc
Bronze	Copper	Tin
Duralumin	Aluminium	Copper

In order for the alloys to be of sufficient quality SmeltCo ltd requires the following production requirements:

- Brass must contain at least 20% copper but no more than 50% copper.
- Bronze must contain at least 60% copper but no more than 80% copper.
- Duralumin must contain at least 45% aluminium, at least 10% copper but no more than 50% copper.

SmeltCo ltd expects to sell one kilogram of brass for £8, one kilogram of bronze for £16 and one kilogram of duralumin for £14. The purchase price and maximum monthly purchase quantity of each raw material can be found in the table below.

Material	Maximum quantity (Kg)	Cost (£/Kg)
Aluminium	50 000	8
Copper	80 000	12
Tin	75 000	2
Zinc	100 000	5

Due to capacity restrictions, SmeltCo ltd can produce no more than 70 000Kg of brass, no more than 100 000Kg of bronze and no more than 90 000Kg of duralumin. Assume that in the blending process, 10% of the raw materials are lost. You can also assume that SmeltCo ltd will sell everything that they produce.

Exercise 1 *Written*

Write a linear optimization model to find SmeltCo ltd's monthly production plan with maximum profit. Suppose that you have a chance to negotiate with your suppliers to procure more raw materials, which raw materials would you like to get extra for? What is the most that you will be willing to pay for the extra raw materials? Present your model and findings in a well organised consultancy report.

Exercise 2 *Computer*

Write a Mosel file for this model and solve the problem with Xpress. Print your results in a suitable format.