1.1 Portfolio optimization

A bank has a capital of C billions of Euro and two available stocks:

1. with an annual revenue of 15% and a risk factor of $\frac{1}{3}$,
2. with an annual revenue of 25% and risk factor of 1.

The risk factor represents the maximum fraction of the stock value that can be lost. A risk factor of 0.25 implies that, if stocks are bought for 100 Euro up to 25 Euro can be lost. It is required that at least half of C is risk-free. The amount of money used to buy stocks of (2) must not be larger than two times that used to buy stocks of (1). At least $\frac{1}{6}$ of C must be invested into (1).

Give a Linear Programming formulation for the problem of determining an optimal portfolio for which the profit is maximized. Solve the problem graphically.

1.2 Gasoline mixture

A refinery produces two types of gasoline, mixing three basic oils according to the following gasoline mixture rules:

	Oil 1	Oil 2	Oil 3	Revenue
Gasoline A	$\leq 30\%$	$\geq 40\%$	-	5.5
Gasoline B	$\leq 50\%$	$\geq 10\%$	-	4.5

The last column of the previous table indicates the profit (Euro/barrel). The availability of each type of oil (in barrel) and the cost (Euro/barrel) are as follows:

Oil	Availability	Cost
1	3000	3
2	2000	6
3	4000	4

Give a Linear Programming formulation for the problem of determining a mixture that maximizes the profit (difference between revenues and costs).