

## Homework assignment 2

Due-date: December 1, 2010, before the exercise session

### Exercise 2

A company manufacturing fine glass accessories produces color glass vases with a flower pattern. Each vase is produced from liquid glass by an artist glass-blower and then set in a storage room to cool to the room temperature. The vases are made in two sizes – large and small – but since the production processes are nearly identical, the two types of vases share the same resources. Each vase, irrespective of its size, takes 20 minutes of the artist's work. The artist works 40 hours each week. A small and a large vase require 10oz. and 20oz. of color glass, respectively. A total of 1.600oz. of colored glass is available per week. In addition, a small vase occupies 2 units of storage space, whereas a large vase occupies 3 units of storage space. The total available storage space is 260 units. A small vase realizes an earnings contribution of 10.00 and a large vase realizes an earnings contribution of 12.00.

1. Formulate the above problem as a linear optimization model with decision variables  $S$  and  $L$ , where  $S$  is the number of small and  $L$  the number of large vases produced. [2 points]
2. Solve the problem graphically. What is the optimal solution? Which constraints are binding at the optimal solution? What is the optimal objective function value? [3 points]
3. Consider the storage capacity constraint. Suppose that the number 260 was changed to 270, i.e. the company has obtained an additional 10 units of storage space. Re-solve the equations of the binding constraints to compute the new optimal solution. How does the new contribution to earnings differ from the contribution to earnings in the previous task? What is the marginal value of the storage space? [3 points]