Otto-von-Guericke-Universität Magdeburg
Fakultät für Wirtschaftswissenschaft
Lehrstuhl für Betriebswirtschaftslehre VIII
- Management Science -
Prof. Dr. Gerhard Wäscher

Management IV (5074)

Production Management & Operations Research

July, 11, 2003

Last name: .... First name: ………… Matriculation number: ....

Assignment #1 (6 points)

Sketch the graph of the experience curve. Do not forget to define the variables which are depicted on the axes! Describe the basic factors which establish the graph!

Assignment #2 (14 points)

Give a general formulation of the classic product-mix problem! Do not forget to define the necessary symbols!

Assignment #3 (15 points)

If possible, by means of the simplex algorithm, determine an optimal solution and the corresponding objective function value of the following linear programming system!

$$x_0 = 3 \cdot x_1 + 5 \cdot x_2$$

$$\begin{aligned} x_1 \quad\quad\quad\quad &\leqq 4 \\ 2 \cdot x_2 &\leqq 12 \\ 3 \cdot x_1 + 2 \cdot x_2 &\leqq 18 \end{aligned}$$

$$x_1 \quad \geqq \quad 0$$

$$x_0 \rightarrow \text{Max!}$$

Assignment #4 (20 points)

A company buys a particular component from a supplier. The corresponding demand for the forthcoming six months (planning period) has been forecasted as follows:

month	t	1	2	3	4	5	6
demand	n_t	200	200	400	400	600	600

The costs of placing one order (ordering costs) are 1.000 Euro, the holding costs amount to 1 Euro per month for each stored product unit.

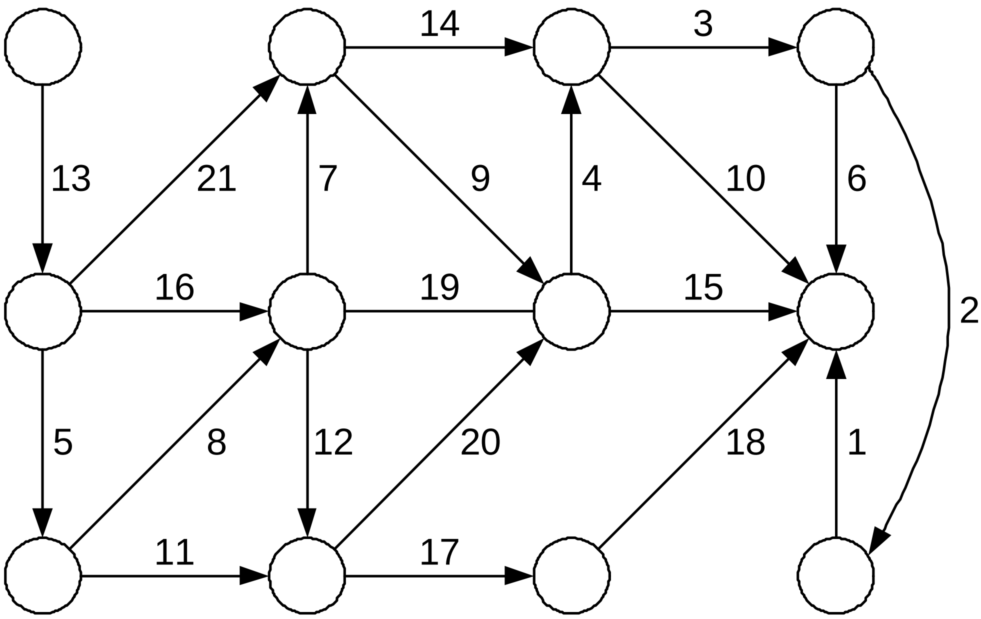
The following assumptions can be made:

- ordered products are received at the beginning of the month and can be processed without delays. Likewise, stored products can only be retrieved from the warehouse at the beginning of each month.
- Inventory at the beginning of the total planning period is zero. Inventory at the end of the planning period is required to be zero.

Determine an ordering policy by means of the Least-Unit-Cost-heuristic and the Silver-Meal-heuristic!

Assignment #5 (10 points)

Determine - if possible - a shortest path from the source to the sink of the following graph by means of Bellman's Algorithm. Also determine the corresponding total distance!



Assignment #6 (15 points)

The following list gives a description of the activities of a project, their durations d(i) and their precedence relationships:

activity i	direct predecessor	duration d(i)
A	-	1
B	A	2
C	A	3
D	C	4
E	A	5
F	B, C	6

a) Determine a CPM-network which represents the project. Minimize the number of artificial activities!
b) How many time units are necessary for finishing the project? Determine the earliest start time, earliest finish time, latest start time, latest finish time, total slack, free slack and independent slack of each activity!

Assignment #7 (20 points)

The following table gives the processing times of four orders (A, B, C, D) on five production stages (1, 2, 3, 4, 5):

production stage / order	1	2	3	4	5
A	2	8	4	2	3
B	7	3	7	5	1
C	2	9	8	3	8
D	3	5	8	2	11

The sequence of the production stages on which the orders are to be processed are identical for all orders. Splitting of orders is not permitted. All orders are available from the start. Further assume that orders may pass each other!

a) Determine an order sequence by means of the Longest Remaining Processing Time-Rule and plot the corresponding GANTT-Chart!
b) Determine the corresponding cycle time, the total idle time, and the capacity utilization!