



## 186.145 Algorithmen auf Graphen VU 2.0

### Exam

**22. November 2006**

Please enter your information using block letters:

Surname:

First name:

Matrikelnummer:

Studienkennzahl:

Please prepare your student ID card.

No technical tools or other additional resources are allowed.

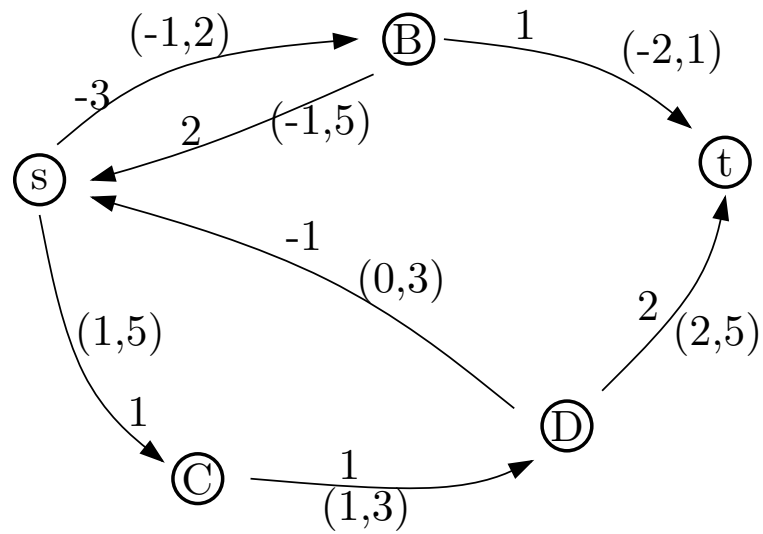
The available working time is 90 minutes.

	Excercises	T1:	T2:	T3:	T4:	T5:	Summe:
Available Pts:	31	16	16	16	16	16	111
Achieved Pts:	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>

Good Luck!

Task 1.: Flows

(16 Points)



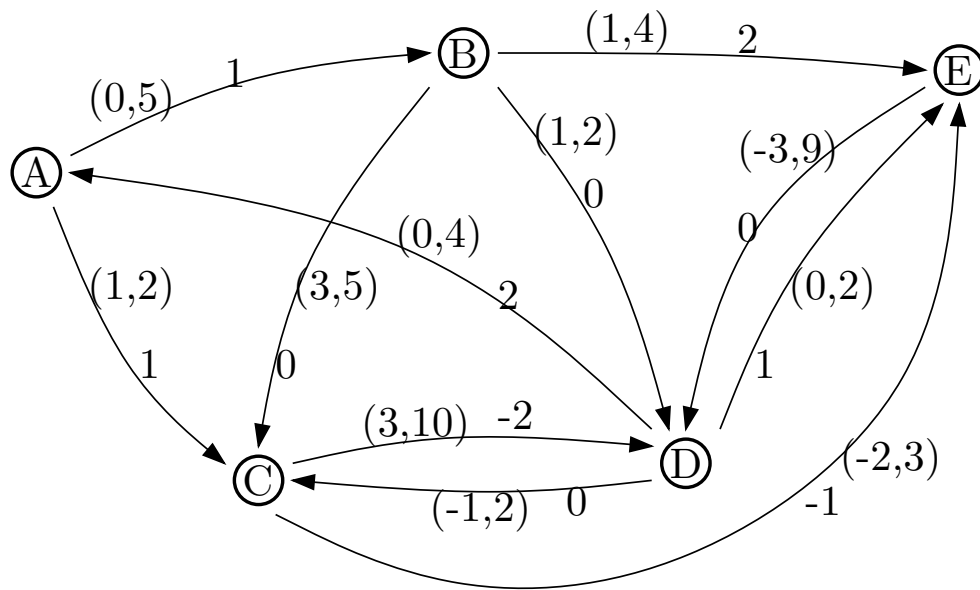
Find a feasible flow by circulations and Hoffman's algorithm for the given network. (For this task you can forget about the given costs.) Write down your calculations.

**Task 2.: Flows****(16 Points)**

Find a minimum cost flow with value 1 if one exists in the network of task 1. If you were not able to find a feasible flow yourself in task 1 use this flow:  $x(s, B) = 2$ ,  $x(B, s) = 1$ ,  $x(s, C) = 3$ ,  $x(D, s) = 0$ ,  $x(C, D) = 3$ ,  $x(B, t) = 1$ ,  $x(D, t) = 3$ .

Task 3.: Network Flows

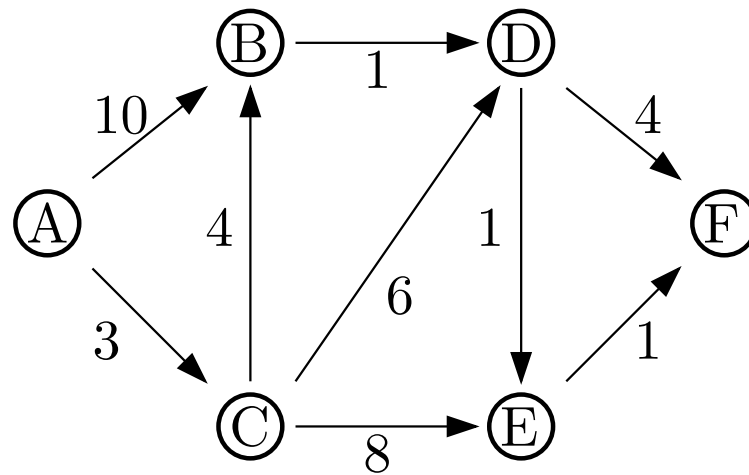
(16 Points)



Give an upper and a lower bound for the values and for the costs of the feasible flows of the given network. Explain your answers. Can there be a flow with value 17? Explain why / why not.

Task 4.: Shortest Path

(16 Points)



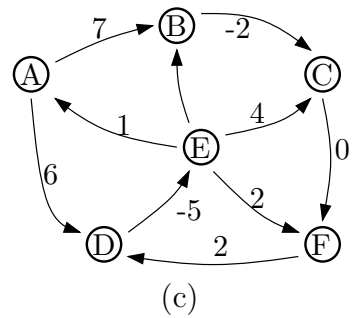
Use one algorithm presented in the lecture of your choice to find the shortest paths from node *A* to node *F*. Please write down your computations.

Algorithm used: \_\_\_\_\_

Shortest path: \_\_\_\_\_

(16 Points)

- (1) The algorithm gives the correct results if applied to the network.
- (2) The algorithm stops if applied to the network.
- (3) The algorithm computes the shortest path from  $i$  to  $j$  for each pair  $(i, j) \in V \times V$ .
- (4) Put the complexity of the algorithm in each cell of the table for the corresponding network. Put nothing, if the algorithm is not applicable to the network.

[illegible]