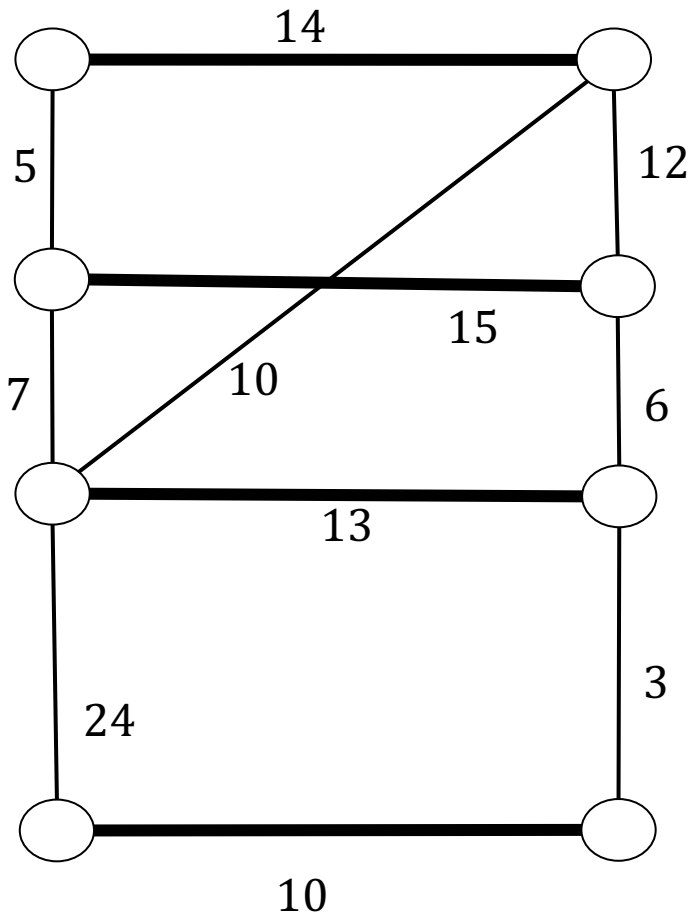
Network Design [Network Flows]
May, 24th 2018

Surname _____
Name _____
Matricola ID _____

Exercise 1

Find the minimum weight perfect matching on the following graph starting from the perfect matching represented by thick arcs.



Exercise 2

Evaluate the optimal solution to the following linear program

$$\min 51\,x_1 + 34\,x_2 + 27\,x_3 + 16\,x_4 + 25\,x_5 + 19\,x_6$$

s.t.

$$x_1 + x_4 \geq 25$$
$$x_2 + x_3 + x_5 \geq 23$$
$$x_1 + x_2 + x_3 + x_5 \geq 21$$
$$x_2 + x_5 \geq 14$$
$$x_1 + x_2 + x_4 + x_5 \geq 39$$
$$x \geq 0$$

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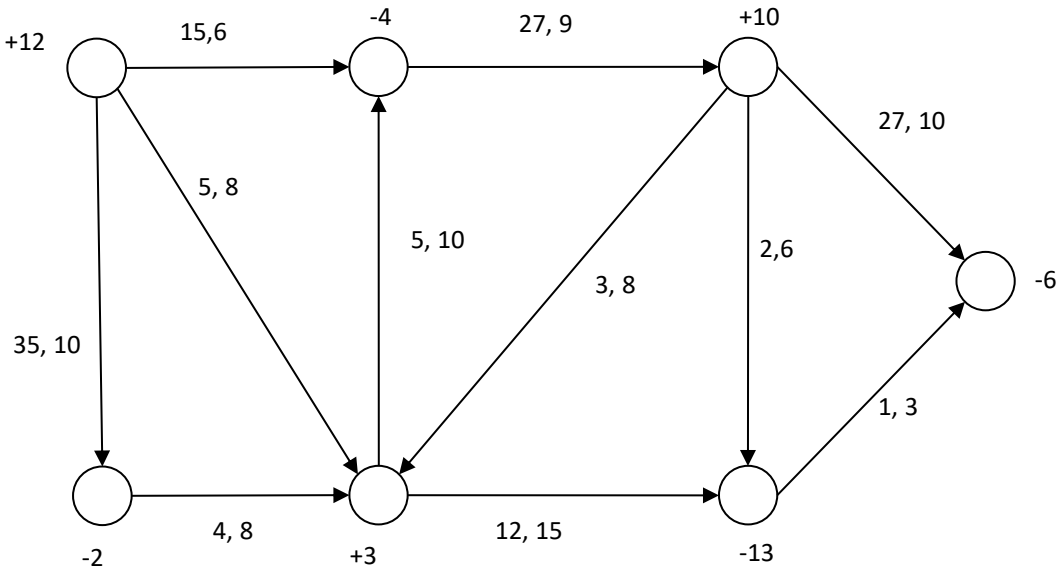
Exercise 3
Evaluate the min cost flow on the following graph.
[(c_{ij}.u_{ij}) are the figures represented on the arcs]



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Bonus question

A company has 2 types of employees: part-time (5 hour workshift) and full-time (7 hour workshift). An employee can start working at {8:00, 9:00, 12:00, 13:00}. For each hourly slot the request of personnel is the following:

8:00 9:00	9:00 10:00	10:00 11:00	11:00 12:00	12:00 13:00	13:00 14:00	14:00 15:00	15:00 16:00	16:00 17:00	17:00 18:00	19:00 20:00
12	15	17	16	12	13	7	6	5	5	2

Given a cost of 250 Euro/day for part time employees and 370 Euro/day for full time employees, find the mix of employees that fulfills the request minimizing the total cost.

Is it useful to allow full time employees start working at 11:00?