CS 660, HOMEWORK 5 (DUE: SUNDAY NOV 24, 11:59 PM)

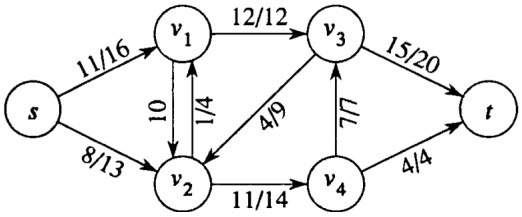
INSTRUCTOR: HOA VU

Each question is worth 25 points. The extra credit question is worth 20 points.

When you are asked to design an algorithm, do the following: a) describe the algorithm, b) explain (or more rigorously prove) why it is correct, and c) provide the running time.

Unless specified otherwise, the problems are from the textbook by Jeff Erickson that we use.

(1) **Question 1:** Problem 3 page 245. The algorithm should run in $O(|V| \log |V| + |E|)$ time (it can be improved to $O(|V| + |E|)$).
(2) **Question 2:** Problem 5 a,b page 369.
(3) **Question 3:** Problem 18 page 376.
(4) **Question 4:** Suppose your boss is throwing a party and want to invite people to come. There are n people that she can invite from. However, she was given a list of pairs of people who should not both be invited (e.g., co-workers who don't like each others, or ex-couples, etc.). Show that given an arbitrary list, deciding if she can invite k people is NP-Complete.
(5) **Extra credit:** Draw the residual network of the following flow.



Draw the new flow after you augment along the path s, v_1, v_2, v_3, t.