ADA Homework Assignment 3

Deadline : April 8 (Thursday) 11.59 pm.

The theory assignment has to be done in a team of at most two members, as already selected by you. The solutions are to be typed either as a word document or latex-ed and uploaded as pdf on GC. We shall strictly not accept solutions written in any other form. Remember that both team members need to upload the HW solution on GC.

Collaboration across teams or seeking help from any sources other than the lectures, notes and texts mentioned on the homepage will be considered an act of plagiarism.

Some questions below are from the text by Jeff Erickson. You can find an online copy here.

Problem 1 (10 points) Recall the following problem from the coding assignment. You are lord Indra and you want to cause rain in a village. There n festivals when the villagers worship you, say festival i occurs on date t_i. You want to cause rain on exactly k of these festivals. Each time it rains, the villagers become complacent and take the rain for granted. You don't want this to happen ; so you want the minimum duration between two consecutive rains to be as long as possible (assume that you have to cause rain on the very first festival).

Hence, you want to pick k out of the n festival days on which you wish it to rain, such that the minimum duration between any pair of rains is as long as possible. Give a polynomial time algorithm to achieve this.

For the theory part, prove the correctness of your algorithm.

Problem 2

a. (5 points) Solve part $4(a)$ from the above text.(you might as well just state a reduction to a known problem and justify why a known algorithm for that problem also works in this case)

b. (10 points) Solve part $9(a)$ from the above text, assuming that all edge weights are distinct. (*Hint:* Understand the proof of Prim's Algorithm till the last detail)