

**Due Time : 11:59pm, Monday October 30, 2017 Submit to Gradescope**

The homework is about convex functions and formulation. The first exercise reviews the log-concavity of Gaussian cumulated distribution. For the second exercise (4.1), we sketch the solution of the optimization problems. The last three exercises cover the network flow, quadratic programming and geometric programming problems. The five exercises worth 1 point each and are graded by completion. For the assignment, we apply the network flow formulation to an example depicted with a directed graph (Part 1). We use CVX code to derive the solution (Part 2). Part 1 of the assignment worths 2 points and part 2 worths 3 points.

**I Exercises from textbook chapters three and four: 3.54, 4.1, 4.12, 4.28, 4.37****II Assignments**

## II.1 [Maximum Flow Problem]

Consider the network with capacities shown in Figure 1. Use CVX program to find the maximum flow of the given network. Node  $S$  is the source, and Node  $T$  is the sink. You are required to submit your formulation, source code, and results.

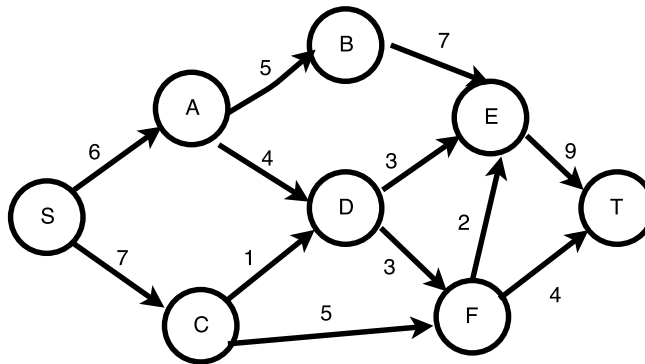


FIGURE 1. The network for Assignment II.1 with capacities shown.

- (1) Formulate the problem.

Hint 1 : our objective is to maximize the flow, a possible formulation is the sum of the outward flow of the source node

Hint 2 : for each node except the source node and the sink node, the total inward flow is equal to the total outward flow

Hint 3 : for every edge, the flow should be less or equal to the assigned capacity

- (2) Following your formulation in (1), solve the problem with CVX.