# VG441 Homework 2

*You are encouraged to type your answer using LaTeX, but scanning document is acceptable. The due date of the homework is on Canvas.*

## Problem 1

An company uses 500 tons of steel per day. Suppose that the steel supplier offers the company a price of \$1490 per ton of steel if $Q < 1200$ tons; \$1220 per ton if $1200 \leq Q < 2400$, and \$1100 per ton if $Q \geq 2400$. Each order incurs a fixed cost of \$2250. The **annual** holding cost rate, $i$, is 0.25. (You will need to divide 0.25 by 365 to get the daily holding cost rate.) Calculate optimal order amount and total cost for the all-units discount structure and the incremental discount structure.

## Problem 2

Suppose there are demands for next 52 periods (*demand.xlsx*). Each order palced to the supplier incurs a fixed cost of \$1100. One unit of product held in inventory for one period incurs a holding cost of \$2.40. Find the optimal order quantities in each period and the optimal total cost. There are three ways that you can solve the problem:

- Mixed integer linear Programming
- Dynamic programming
- Reformulation as a shortest path problem and use Dijkstra's algorithm

You can utilize the codes posted on canvas and modify them to suit your need. Submit both code and result using at least one method, but you are welcome to submit all three.

# Problem 3

**Task 1:** Run Ford-Fulkerson algorithm for given graph shown in Figure 1. Wirte down the path you find and plot the residue graph in each iteration.

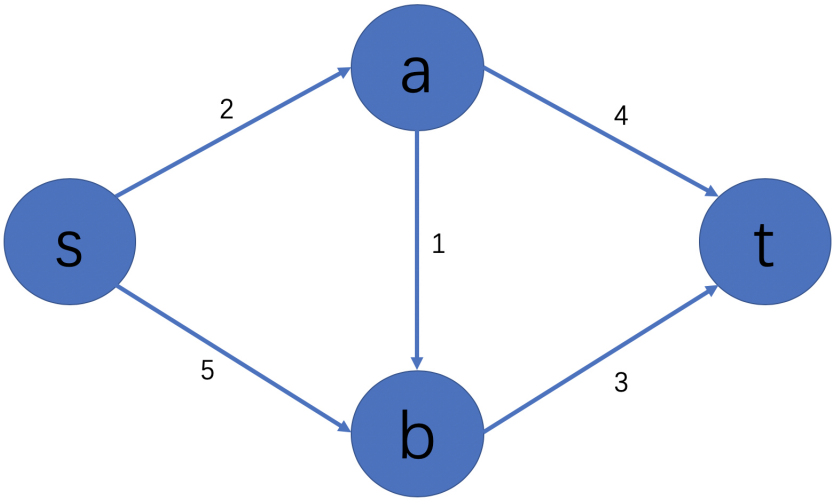


Figure 1: Graph for Task 1

**Task 2:** If the algorithm that is used to find $s$–$t$ path prefers edge $E_{ab}$ each time, will it have an influence on the performance of Ford-Fulkerson algorithm? Please explain.

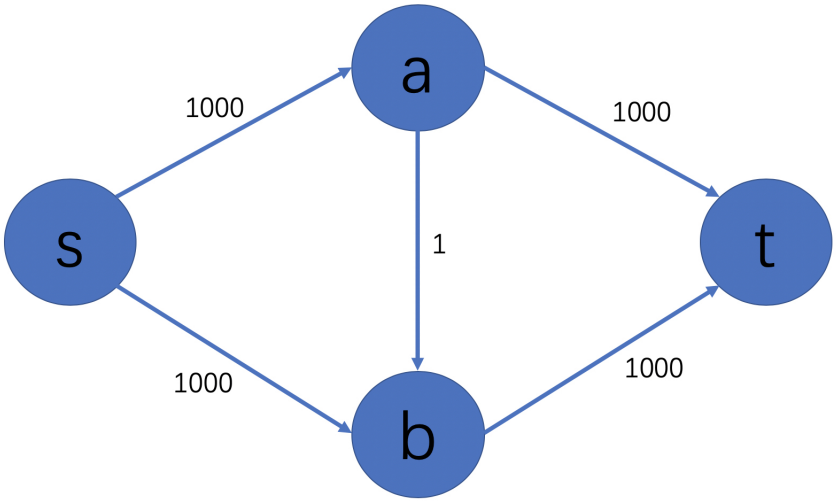


Figure 2: Graph for Task 2