

Assignment 6

Responsible TA: Claudi Lleyda Moltó

Delivery instructions

To deliver an assignment you have to make sure you deliver both parts. You can deliver as many times as you want before the deadline on Blackboard. Delivery should be done in two separate files according to the following specifications.

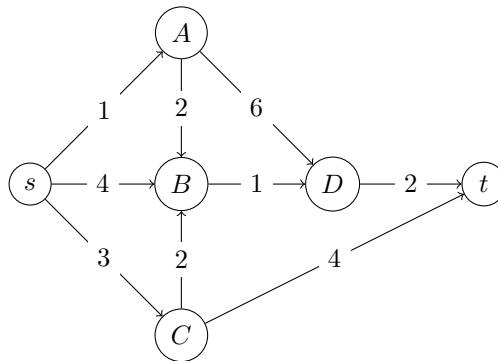
The theoretical question answers must be uploaded as PDF, how you answer the questions (handwritten scans, Word, L^AT_EX, etc.) doesn't matter, as long as they are delivered as a single PDF file and the answers are readable. The filename should contain your NTNU username and the assignment number, for instance: **karinor-06.pdf**.

The notebook should be delivered in full (as **.ipynb**). That way the TAs can easily run your code and verify the output. The filename should contain your NTNU username and the assignment number, for instance: **karinor-06.ipynb**.

Theory

Task 1 - Bellman-Ford algorithm

Consider the following directed weighted graph



Find the shortest path from node s to node t using the Bellman-Ford algorithm. Show the step-by-step process, including the values of the distance labels at each iteration.

Task 2 - Coin combinations

Given the currency denominations for Norwegian krone coins $C = \{1, 5, 10, 20\}$, design a dynamic programming algorithm to count in how many ways can an amount be obtained.

For example, to make 6 kroner there are two options: $1+5$ and $1+1+1+1+1+1$.

Task 3 - Grid traveling

Given an $n \times m$ grid, design an algorithm to calculate how many ways there are to travel from the top-left cell to the bottom-right cell, given you can only move right or down from one cell to another.

Programming

This part should be solved in the corresponding Jupyter Notebook. Refer to the notebook for further details and instructions regarding the programming tasks.

Assignment submission

The assignments will be given out on Blackboard where each assignment has a written theoretical part and a programming part in Python using Jupyter Notebook. The notebook task can be solved locally (for instance in VSCode), or you can upload the notebook to JupyterHub and run the code there.

The notebooks will guide you through a, more or less, specific solution to a problem. You are however encouraged to attempt to implement your own/other solutions, as long as

- you don't use any additional libraries or packages,
- you don't alter the input values or structures, and
- your solution solves the problem described in the assignment.