Network Optimization (Fall 2024): Homework 7

- AMO stands for the text (Ahuja, Magnanti, Orlin). Exercises and page numbers are listed from AMO.
- The total points (given in parentheses) add up to 110. Math 566 students will be graded for 105 points, and Math 466 students for 90 points.

- **Send your submission to kbala@wsu.edu. Your main submission should be in a PDF file**. You are welcome to write answers by hand, and scan the writings (or take pictures of your writings) **into a PDF file**. You can also include output from running your program (for Problem 5) in the PDF file.
- Include all files—the main PDF and any program (.m) files—in a **zipped** folder.
- **You will not be allowed to include .py files in your email attachment. Notebooks (.ipynb files) are allowed. Another option is to rename your .py files as .txt instead.**
- **Your folder name should identify you in the following manner. If you are Jimbo Kern, you should name your folder JimboKern_Hw7.zip. If you want to add more bits to the title, e.g., Math566, you could name it JimboKern_Math566_Hw7.zip, for instance. But you should start the file name with JimboKern. Please avoid white spaces in the file name.**
- **Begin the SUBJECT of your email submission with the same `FirstnameLastname`, expression, e.g., "JimboKern Hw7 submission".**
- **This homework is due by 11:59 PM on Thursday, October 16**.

1. (20) AMO 5.10 (page 159).
2. (20) AMO 5.18 (page 160).
3. (20) AMO 5.21 (page 160).
4. (20) **[G]** AMO 5.41 (page 161).
5. (30) Write a Matlab (or another language/package) function that takes as input the forward star representation of a network and a starting node s, and finds the shortest path to all nodes using the FIFO label correcting algorithm. The program should output the `pred` vector as well as the shortest path lengths (the vector d).

   - Name your file **`FIFOLC_FirstnameLastname.m`** (e.g., `FIFOLC_JimboKern.m`) and include the file in your homework submission.
   - Demonstrate your code by solving the shortest path instance given in Figure Figure 5.10 (b), page 158. You **must** include the output for this instance in your submission. You're welcome to include the output as part of the main PDF file itself, or as part of the code submission file (as part of comments, for instance). But if you are sending in a separate file for the output, it must be **in text format** and should be named **`Output_FIFOLC_FirstnameLastname.txt`**
   - Your function must take **the entire Forward Star matrix as a single input**—from a text file, or it could be typed in as part of separate code that you turn in, for instance. In particular, **your code must not prompt the user to input each arc one at a time!**