Homework 10

This is an individual assignment. All work that you submit for credit must be your own.

1. Sports of All Sorts produces, distributes, and sells high-quality skateboards. Its supply chain consists of three factories that produce the skateboards in Detroit, Los Angeles, and Austin. The Detroit and Los Angeles factories can produce 350 skateboards per week, and the larger factory in Austin can produce up to 700 skateboards per week. The skateboards are shipped from these factories to four distribution centers located in Iowa, Maryland, Idaho, and Arkansas. Each distribution center can process up to 500 skateboards per week. The skateboards are then shipped from the distribution centers to three major retailers: Just Sports, Sports N Stuff, and Sports Dude. Just Sports requires 200 skateboards per week, Sports N Stuff requires 500 skateboards per week, and Sports Dude requires 650 skateboards per week. The two tables below indicate the shipping costs per skateboard from the factories to the distribution centers and from the distribution centers to the retailers.

	Distribution Center			
Factory	Iowa	Maryland	Idaho	Arkansas
Detroit	$25.00	$25.00	$35.00	$40.00
Los Angeles	$35.00	$45.00	$35.00	$42.50
Austin	$40.00	$40.00	$42.50	$32.50

	Distribution Center			
Retailer	Iowa	Maryland	Idaho	Arkansas
Just Sports	$30.00	$20.00	$35.00	$27.50
Sports N Stuff	$27.50	$32.50	$40.00	$25.00
Sports Dude	$30.00	$40.00	$32.50	$42.50

   a. Construct an optimization model in a Jupyter Notebook using Python to find the best distribution plan for the skateboards.

   b. Sports of All Sorts is considering an expansion of the Iowa DC to accommodate 800 skateboards per week. The annual amortized cost of this expansion is $40,000 assuming 50 weeks per year. Should Sports of All Sorts invest in this expansion?

2. Construct an optimization model using Python in a Jupyter network to find the shortest path from node 1 to node 7 in the network graph below.