MIS 381N

Stochastic Control and Optimization:

For this Homework, you do not need to make any submission. These questions are for your practice. The solutions will be posted soon.

Problem 1:

A shoe company forecasts the following demands during the next six months: month 1—200; month 2—260; month 3—240; month 4—340; month 5—190; month 6—150. It costs $7 to produce a pair of shoes with regular-time labor (RT) and $11 with overtime labor (OT). During each month, regular production is limited to 200 pairs of shoes, and overtime production is limited to 100 pairs. It costs $1 per month to hold a pair of shoes in inventory. Formulate a network optimization problem to minimize the total cost of meeting the next six months of demand on time.

We construct the network as below.

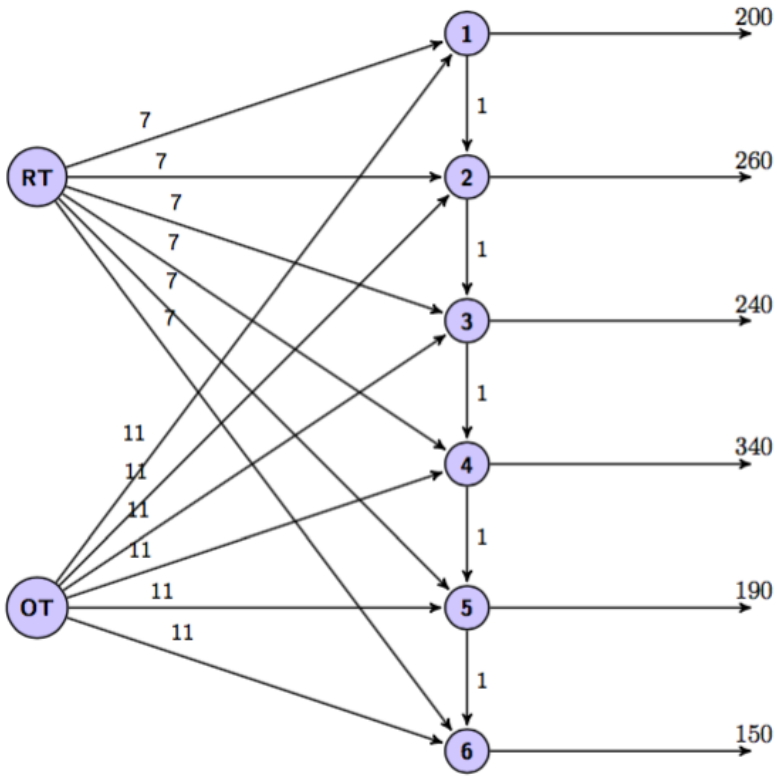

Figure 1: Network for 1st problem.

Problem 2:

The U.S. government is auctioning off oil leases at two sites: 1 and 2. At each site, 100,000 acres of land are to be auctioned. Cliff Ewing (C), Blake Barnes (B), and Alexis Pickens (A) are bidding for the oil. Government rules state that no bidder can receive more than 40% of the land being auctioned. In other words, each company can get at most 80,000 acres in total. Cliff has bid $1,000/acre for site 1 land and $2,000/acre for site 2 land. Blake has bid $900/acre for site 1 land and $2,200/acre for site 2 land. Alexis has bid $1,100/acre for site 1 land and $1,900/acre for site 2 land. Formulate a balanced transportation model to maximize the government's revenue.

We construct the network as below.

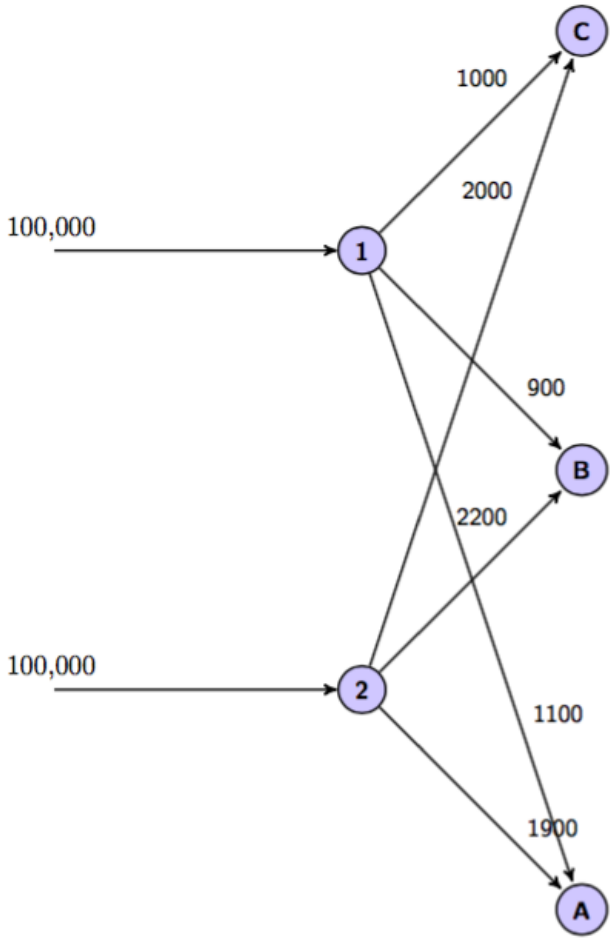

Figure 3: Network for 2nd problem.

Problem 3:

Doc Councillman is putting together a relay team for the 400-meter relay. Each swimmer must swim 100 meters of breaststroke, backstroke, butterfly, or freestyle. All four strokes should be in the relay. Doc believes that each swimmer will attain the times given in Table below. To minimize the team's time for the race, which swimmer should swim which stroke?

	Time (seconds)			
Swimmer	Free	Breast	Fly	Back
Gary Hall	54	54	51	53
Mark Spitz	51	57	52	52
Jim Montgomery	50	53	54	56
Chet Jastremski	56	54	55	53