UNIVERSITY of WISCONSIN
UWMILWAUKEE

# CIV 590 Urban Transportation Planning

Fall 2018

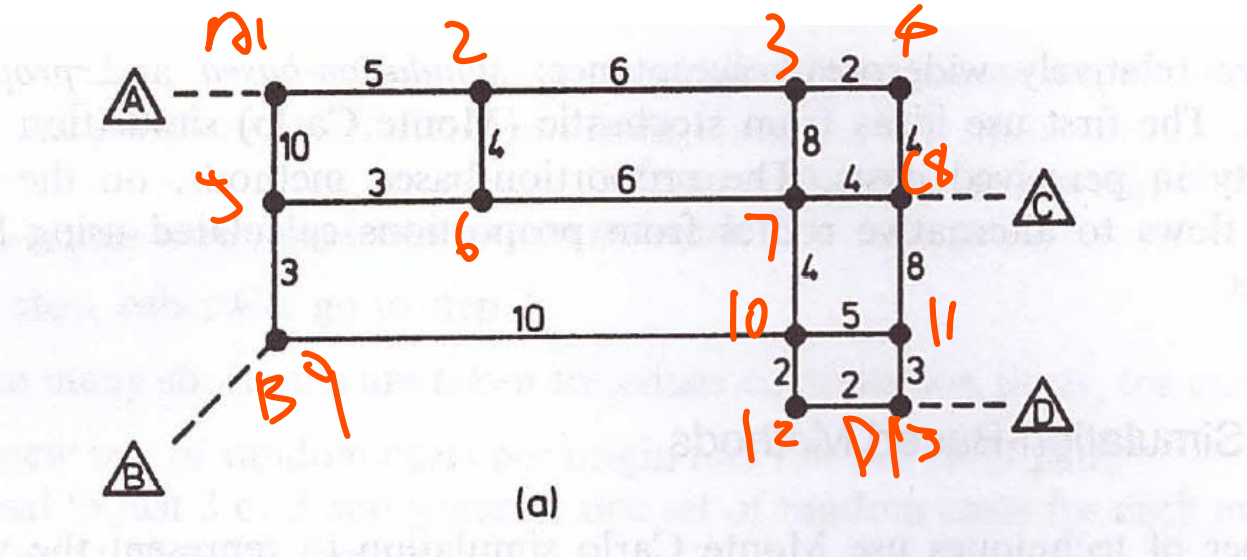
Assignment No. 4
100 Points

**Question 1 (40 Points)**

The travel time for each link is given for the street network below. Consider the trip table as

| | A | B | C | D |
|---|---|---|---|---|
| A | 0 | 0 | 400 | 200 |
| B | 0 | 0 | 300 | 100 |
| C | 0 | 0 | 0 | 0 |
| D | 0 | 0 | 0 | 0 |

Please compute the link volume using all-or-nothing traffic assignment algorithm.



**Question 2 (20 points)** Three route connect an origin and a destination with performance function $t_1=8+0.5x_1$, $t_2=1+2x_2$, and $t_3=3+0.75x_3$, with the x's expressed in thousands of vehicles per hour and the t's expressed in minutes. If the peak-hour traffic demand is 3000 vehicles, determine user equilibrium traffic flow.

**Question 3 (20 points)** Two routes connect an origin and destination with performance functions $t_1=5+3x_1$ and $t_2=7+x_2$, the x's expressed in thousands of vehicles per hour and the t's expressed in minutes. Total O-D demand is 7000 vehicles in the peak hour. Determine the user equilibrium and system optimal route flows and total travel times.

**Question 4 (20 points)** Two routes connect an origin and a destination. The performance functions are $t1=3+1.5(x_1/c_1)$ and $t2=5+4(x_2/c_2)$, the OD demand is 6000 vehicles per hour, and $c_1$ and $c_2$ are equal to 2000 and 1500 vph, respectively. Proposed capacity improvements will increase $c_2$ by 1000 vph. It is known the current routes are in user equilibrium, and it is estimated that each 1-minute reduction in route travel time will attract an additional 500 vph. What will the user equilibrium flows and total hourly OD demand be after the capacity improvement?