Traffic Concepts, Traffic Theory, and Queuing

Using the excel spreadsheet available on the course website (which shows data for traffic in <u>2 lanes</u> in the same direction of an urban freeway), provide the following:

- 1. A plot showing flow (vehicles per hour) for each 20 second interval. Use the flow from the previous hour for each 20 second interval.
- 2. What is the average flow over the 24 hours?
- 3. What is the average flow between 6:00 and 7:00 am?
- 4. What is the maximum flow? During which hour is this observed?
- 5. Estimate speed for each 20 second interval. Provide a plot of speed (on the vertical axis) versus occupancy (on the horizontal axis). Estimate a trend line of the appropriate form. What are the intercept and slope of the line? Describe how this empirical data compares to the relationship assumed within the context of traffic flow theory.
- 6. Provide a plot of flow (on the vertical axis) versus occupancy (on the horizontal axis). Describe how this empirical data compares to the relationship assumed within the context of traffic flow theory.
- 7. Provide a plot of speed (on the vertical axis) to flow (on the horizontal axis). Describe how this empirical data compares to the relationship assumed within the context of traffic flow theory.
- 8. Estimate the capacity of a lane of the roadway.
- If an incident occurs at 7:30 am and lasts 5 minutes, closing one lane of the highway, when will the queue dissipate? Assume the arrival rate at 7:30 am reflects the arrival rate during the entire period in question. Assume a D/D/1 queuing model.
- 10. If an incident occurs at 7:30 am and lasts 10 minutes, closing one lane of the highway, when do you anticipate the queue will dissipate?
- 11. Create a histogram of the number of arrivals in each 20 second period for the time between 7:30 am and 8:30 am. Estimate the parameters of a poisson distribution to fit this curve. Estimate the parameters of a normal distribution to fit this curve.