CE 361
In-Class Design Problem #6:
Freeway level of service

Name_____

1. A four-lane freeway (two lanes each direction) is located on rolling terrain, has 11-ft lanes, no lateral obstructions within 4 ft of the pavement edges, and 5 on/off ramps within 3 miles upstream and 3 miles downstream of the midpoint of the analysis segment. The traffic stream consists of cars, buses, and large trucks (no recreational vehicles). A weekday directional peak-hour volume of 1800 vehicles (familiar users) is observed with 700 arriving in the most congested 15-min period.

   If a level of service no worse than D is desired:

   a) what the maximum number of large trucks and buses that can be present in the peak-hour traffic stream
   b) what is the traffic density under these conditions
   c) what is traffic speed under these conditions?

2. Consider again the same four-lane freeway as in Part 1. Suppose a new commercial area has caused an increase in traffic flow so that the directional peak-hour volume is now 2800 vehicles (familiar users) with 1000 arriving in the most congested 15-min period. There are now 20 percent truck and buses and no recreational vehicles. Instead of rolling terrain, you wish to analyze the traffic on a segment of roadway that has a 3% grade for 1 mile. All other parameters are the same as in Part 1.

   Determine:

   a) the level of service,
   b) the operating speed, and
   c) the density.