

### TRANSIT DEMAND AND EQUIPMENT REPLACEMENT

Dear Consultant:

Although shrinkage ratio elasticity is the “industry standard”, it has severe drawbacks. In this assignment, we ask you to demonstrate your competence with another elasticity method. We are also aware of the controversy surrounding the use of annual LCC/mile as the basis for the bus replacement decision. We ask you to demonstrate alternatives to that method. The maximum size of your working group should be two students. Signatures as usual.

1. **Midpoint elasticity.** In the year 2000, the Mythaca Bus Company carried 5964 cash-paying riders when the cash fare was \$0.50. After a cash fare increase to \$0.75, the cash-paying ridership fell to 4711 in 2001.
  - A. (10 points) Use the *midpoint elasticity* equation to compute the demand elasticity of cash-paying MBC riders with respect to fare.
  - B. (10 points) Is the transit demand elastic or inelastic with respect to fare? On what do you base your conclusion?
  - C. (10 points) Some members of the MBC Board of Directors want to restore the old \$0.50 cash fare in 2003. Use the midpoint elasticity to estimate cash-paying ridership in 2003 at the lower fare.
  
2. **Bus replacement policy.** Some MBC Board members have ideas that might help them use the data in CNotes Table 10.8 to decide on the year to plan to replace the bus. Help them implement their ideas.
  - A. (10 points) Add a column to the right of the “Ann LCC/mi” column called “Cumul Cost/mi”. For each year  $y$ , this column will contain the ratio of cumulative cost (years 1 to  $y$ ) to cumulative miles. Using the entries in this column, when should the bus be replaced? Explain as necessary.
  - B. (10 points) Using a discount rate of 0.045, add a column labeled “PWC” that shows the PW of costs for each year. Finally, add a column “EUAC” that shows the equivalent uniform annual costs of the cumulative costs incurred through each year. Using the entries in these columns, when should the bus be replaced? Explain as necessary.
  - C. (10 points) Which replacement decision method should be used by MBC – Ann LCC/mi, Cumul Cost/mi, PWC, or EUAC? Explain.