Instructions: To receive credit, you must complete and include all work necessary to support your conclusions. After you have shown all your work, summarize your work on the first page of your homework. Failure to follow these instructions will result in you receiving less than full credit.

Due: February 5, 2004 at the beginning of class.

1. Given \( S = \frac{\%\Delta C}{\%\Delta Q} \), show that \( S = \frac{MC}{AC} \). In relation to 1, what is the relationship between 1, S and IRTS, CRTS and DRTS?

2. Given the demand curve \( P = \alpha - \beta Q \) and \( MC = c \), what is the profit maximizing quantity of a competitive firm? Hint: Your answer should be expressed only in terms of \( \alpha \) and \( \beta \).

3. Given the demand curve \( P = \alpha - \beta Q \) and \( MC = c \), what is the profit maximizing price? Hint: Your answer should be expressed only in terms of \( \alpha \) and \( \beta \).

4. Graph the profit maximizing firm using the information in questions #2 and #3.

5. Given \( P = 100 - Q \) and \( C(Q) = 0.5Q \), what is total welfare in the market?

6. A firm can choose between two production technologies for a new product line. If it installs technology 1, its yearly costs will be \( C_1(q) = 3600 + 65q + 36q^2 \). If it installs technology 2, yearly costs will be \( C_2(q) = 900 + 900q + q^2 \).
   A) What is the minimum efficient scale for each technology?
   B) Which technology is preferred (strictly from a cost standpoint) if it is expected to sell 30 units in summer and 10 units in winter?
   C) What if sales were expected to be 10 units in summer and 30 units in winter?

7. Question 7, page 49 in the book. Should the cars and trucks be produced together or separate?