## Economics 205 UNIVERSITY OF VICTORIA Managerial Economics Spring Term, 2014 <u>Assignment 3</u>

**Due:** <u>Thursday</u>, March 6, 2014, 3 pm. (In the boxes marked "ECON 205" near the Economics Department Office.) Show your work!

Question 1: Textbook question page 314, #1. (3 marks)

Given:  $Q = 100K^{0.5}L^{0.5}$ , C=\$1000, w=\$30 and r =\$40, show how to determine the amount of labour and capital that the firm should use in order to maximize output?

## Question 2: Textbook question page 314, #3. (3 marks)

Given:  $Q = 100K^{0.5}L^{0.5}$ , w=\$50, and r =\$40, show how to determine the amount of labour and capital that the firm should use in order to minimize the cost of producing 1118 units of output. What is this minimum cost?

Question 3: Textbook question page 357, #15. (8 marks)

The manager of the Electronic Corporation has estimated the total variable costs and the total fixed cost functions for producing a particular type of camera to be:

TVC = 60Q-12Q2 + Q3TFC = 100

The corporation sells the camera at the price of \$60 each. An engineering study just published estimated that if the corporation employs newly developed technology, the long-run total cost function would be

TC = 50 + 20Q + 2w + 3r.

The manager asks you to find:

(a) AVC and MC functions, the output level at which the two curves cross, and a plot of them.

(b) the breakeven output of the firm and the output at which the firm maximizes its total profits;

(c) the long-run average cost and long-run marginal cost functions with the new technology if w = \$20 and r = \$10, and plot them.

(d) Should the corporation\_adopt the new technology? It if did, what would be the profit maximizing level of output if the firm can continue to sell its cameras at the price of \$60 per unit?

**Question 4**: The Speedy Company is a manufacturer race timers. The operations manager has determined that the firm's output (Q) is related to how engineers (E) and technicians (T) are combined in the production process:  $Q = -5.68 - 0.32E - 0.42T + 6.35\sqrt{E} + 8.52\sqrt{T} + 0.34\sqrt{ET}$ .

If the wage of an engineer is \$36,000 and the wage of a technician is \$24,000, and the total amount the firm spends on both engineers and technicians is \$6 million, determine the expressions that must be satisfied simultaneously to obtain the optimal values of E and T. (3 marks)

## **Question 5 (5 Marks)**

Explain the why the short-run minimum cost of producing a certain output may differ from the long-run minimum cost. Illustrate your explanation with a diagram.

## **Question 6:** (3 marks)

For each production function determine the:

- (A) Determine the marginal product of labour.
- (B) Determine the marginal product of capital.
- (C) Marginal rate of technical substitution
- i)  $Q = 9L^{0.3}K^{0.7}$
- ii)  $Q = 3L^{0.8}K^{0.2}$