Examination Period 3: 2016/17

ECN201317N

Module Title  Intermediate Microeconomics
Level Five
Time Allowed Two hours

Instructions to students:
• Enter your student number not your name on all answer books.
• Answer three out of four questions.
• All questions are equally weighted.
• The use of electronic calculators of an approved type is permitted.

No. of Pages 3
No. of Questions 4
Answer **three** out of **four** questions.

1. Samuel has preferences over apples (A) and pears (P). His utility level is currently 50. The price of apples is equal to the price of pears, \( P_A = P_P = 1.5 \), and his *indirect* utility function is:

\[
V(P_A, P_P, I) = \frac{M}{2\sqrt{P_A P_P}}.
\]

**a.** What is Samuel’s minimum expenditure when purchasing the optimal amounts of apples and pears?  
(10 marks)

**b.** Find those optimal amounts.  
(10 marks)

**c.** The price of pears has doubled, being now \( P_P = 3 \), while the price of apples remains unchanged. How much of an increase in income would Samuel need for his utility to remain unchanged despite the price increase?  
(13 marks)

**Total: 33 marks**

2. A firm produces output according to the production function:

\[
y = f(L, K) = L^{\frac{1}{4}} K^{\frac{3}{4}}.
\]

The wage rate is 3, the rental rate of capital is 3, and \( y \) is output.

**a.** The firm wants to find the least-costly means of producing \( y \) units of output. Set up the Lagrangian for the firm’s (long-run) cost-minimization problem.  
(7 marks)

**b.** What are the first-order conditions for the firm’s cost-minimization problem?  
(7 marks)

**c.** Derive the conditional factor demands, \( L(y) \) and \( K(y) \).  
(9 marks)

**d.** Derive the firm’s (long-run) total cost function \( C(y) \), and find the marginal and average cost functions as well.  
(10 marks)

**Total: 33 marks**
3. Suppose there are only two firms in the Frisbee industry, Flying Discs Inc., and Spinning Circle PLC. Let the two firms have identical cost functions \( C(Y) = 40Y \), where \( Y \) is output. Let the inverse demand curve for Frisbees be given by \( P = 100 - Y \). Each firm expects the other to behave as a Cournot competitor.

   a. Calculate the Cournot-Nash equilibrium for each firm, assuming that each chooses the output level that maximizes its profits when taking its rival’s output as given. What are the profits of each firm? (9 marks)

   b. What would be the equilibrium quantity if Flying Discs Inc. had constant marginal and average costs of £25, and Spinning Circle PLC had constant marginal and average costs of £40? (10 marks)

   c. Assuming that both firms have the original cost function, \( C(Y) = 40Y \), how much should Spinning Circle PLC be willing to invest to lower its marginal cost from £40 to £25, assuming that Flying Discs Inc. will not follow suit? How much should Flying Discs Inc. be willing to spend to reduce its marginal cost to £25, assuming that Spinning Circle PLC will have marginal costs of 25 regardless of Flying Discs Inc’s actions? (14 marks)

   Total: 33 marks

4. Seth’s utility function is given by \( U(W) = \sqrt{10W} \), where \( W \) represents annual income in thousands of pounds.

   a. Is Seth risk loving, risk neutral, or risk averse? Why? (7 marks)

   b. Suppose that Seth is currently earning an income of £40,000 (\( W=40 \)) and can earn that income next year with certainty. He is offered a chance to take a new job that offers a 0.6 probability of earning £44,000 and a 0.4 probability of earning £33,000. Should he take the new job? (13 marks)

   c. Would Seth be willing to buy insurance to protect against the variable income associated with the new job? If so, how much would he be willing to pay for that insurance? (Hint: What is the risk premium?) (13 marks)

   Total: 33 marks

End of Paper