

注意事項：

- 一、請將所有答案填寫於試卷內(Part VI 除外)。
- 二、請依題號順序作答。
- 三、可以用中文答題。

Part I

A digital multi-sided platform is a web space where different participants interact with each other and exchange information or goods/services through a technologically structured system to create value. Examples of multi-sided platforms are Facebook, Uber, Airbnb, Amazon, Google and Apple. For example, in a credit card platform (e.g. Visa or Mastercard), there are three sides: consumers, banks and merchants to conduct transactions on a platform. Typically, a digital platform exhibits high user acquisition costs, high fixed costs, low marginal cost and “increasing” returns to scale. Based on the economic characteristics of a platform, please answer the following questions:

True and False questions: one point each and one point penalty for each wrong answer. Total score, after penalties, will not be negative.

Please write your answers (T for True, or F for False on the exam book. (請在答案卷上註明題號和答案.) (10 points)

1. Multisided platforms have first mover advantages.
2. Multisided platforms show strong network externalities.
3. Winner-takes-all is a common phenomenon in platform businesses.
4. In platform businesses, the side with high price elasticities will subsidize the side with lower price elasticities.
5. For platform participants, it is a zero-sum game.
6. Value chain analysis is a better tool to analyze a platform than value net analysis.
7. iOS (iPhone operating system) has tighter rules of access than Google’s Android platform.
8. Low shopping costs on the Internet results in one-stop shopping, other things being equal.
9. High user acquisition costs result in high user switching costs.
10. Increasing returns to scale means a declining average cost curve.

見背面

Part II

The Petroleum Industry

Petroleum has been a major input to the economy as well as a strategic asset for many countries. Petroleum and its related downstream products have accounted for more than 10% of GNP. Due to geographical concentration of production in Middle Eastern areas, in the last fifty years, the price of petroleum had been controlled by OPEC (Organization of Petroleum Export Countries). Oil prices have been used as a strategic weapon to achieve these countries' economic as well political objectives. As a result, we have witnessed wild swings in oil prices over the last fifty years. For example, the oil price was as high as \$160 a barrel in 2007 and \$26 a barrel in Feb. 2016. What factors contribute to the oil price fluctuations? What are possible impacts on the world economy?

Before 1973, the oil price was around \$3 a barrel. To protest against Israel's war with Egypt, OPEC created the first oil crisis by limiting output. As a result, the price of oil rose to \$12 a barrel. In 1979, the oil price rose again to \$24 a barrel and in 1982, the oil price was as high as \$36 a barrel. As a result, both inflation and US interest rates increased dramatically. In 1982, the prime rate was as high as 22% resulting an economic recession.

After 1982, oil prices fell and remained at around \$20 a barrel till 2000. After 2000, due to increased demand from China and India, oil prices rose to as high as \$160 a barrel in 2007. However, during the 2008 financial crisis, the oil price was as low as \$40. But as the world economy prospered after 2009, oil prices rose to above \$100 a barrel. Price, supply and income elasticities could explain the fluctuations of oil prices.

Based on a study from MIT, the short-term price elasticity of oil is 0.07. It means that if the oil price increases by 1%, other things being equal, demand for oil will be reduced by 0.07% in the short run. The long-term price elasticity of oil, however, is as high as 1.07%. However, long-term means 7-10 years. The very low short-term price elasticities of oil can explain why oil prices could increase dramatically in the short-run and increase the revenue of oil producing countries. But as oil prices rose by 12 times in 9 years (1973-1982), the effects of long-term price elasticities kicked in, resulting in lower demand for oil.

Based on an IMF (International Monetary Fund) study, a 10% rise in oil price will reduce worldwide GNP by 0.02%, without counting the impact on inflation. As oil prices pushed up inflation in the early 1980s, high interest rates at that time created severe recession in the US and the world, which in turn, dampened the demand for oil.

In addition, when oil prices are high, oil companies explored new oil wells all over the world. As long as the production cost of oil is lower than the market price, oil wells will keep on pumping out oil. But if the oil price is lower than production costs, the well will be sealed off temporarily. These wells are called marginal wells as they will be opened and start production when oil prices are higher. These marginal wells impose a price limit on oil as the oil supply will increase when prices are high.

The impact of long-term price elasticities, income elasticities and marginal wells put a lid on oil prices after 1983. Oil prices remained around \$20 a barrel from 1982-2000.

An example of supply elasticity is shale oil. In early 2000, oil prices ranged from \$100 to \$160 a barrel. The US developed the hydraulic fracturing method to use a highly pressurized water knife to break shale rock and extract oil and gas. As US is rich in shale and a lot of underground water, shale oil production reached 1 million barrels a day in 2010 and 4.5 million barrels a day in 2015. The shale oil from the US poses a

threat to the monopoly position of OPEC. In response to US shale's oil expansion, OPEC maintained its production quota and as a result, oil prices tumbled to \$60 in December 2014. Some economists think that this is typical predatory pricing and is not rational. Predatory pricing means that the firm lowers prices to drive out competitors and then raises the price later on.

World demand for oil is about 93 million barrels a day and OPEC produces 30 million barrels a day at a cost of \$7-10 a barrel. It would generate more revenue for OPEC to yield 5 million barrels a day to US shale oil and keep the price at \$100 a barrel. If OPEC cuts production by 5 million barrels a day, its total output would be 25 million barrels a day. At \$100 a barrel, revenue will be \$2.5 billion a day. By insisting on \$60 a barrel and not cutting output, the revenue for OPEC is \$1.8 billion a day. So, OPEC should cut production instead of cutting prices. But in the long run, OPEC wants to put pressure on US shale oil producers and majority of them produce shale oil at about \$60 a barrel. In 2015, oil prices kept falling and in Feb. 2016, the price fell to \$26 a barrel. More than half of US shale oil producers went out of business with a total loss of \$66.7 billion. It was not until November 2016 that OPEC and Russia agreed to cut production and oil prices recovered to \$50.

Questions: **NOTE: please indicate your answers by highlighting the answer to PART II Question 11, 12, 13 ... in your answer book. (是 PART II, 11, 12, 13 ... 題,可以用中文答題)**

11. In 1991, Iraq invaded Kuwait. At that time, Iraq and Kuwait oil output were 3 million and 1.5 million barrels a day respectively. In 1991, worldwide demand was 76 million barrels a day. Because of the war, both Iraq and Kuwait oil outputs were not available for sale to the market, so, on the day of invasion, the oil price jumped to \$45 a barrel from \$20 a barrel before the war. If you were an investor in oil, assuming other things being equal, should you short or buy the oil on that day? Explain why and show your calculations. (2 points)
12. Similarly, in 2011, the revolution in Libya wiped out its oil output (1.65 million barrels a day which is about 2% of world oil demand). The price of oil jumped from \$80 to \$104 right after the revolution. Other things being equal, should you buy or short the oil or do nothing? Explain why and show your calculations. (2 points)
13. Will OPEC's predatory pricing be successful to defend their market share and profits in the long run? Explain why or why not. (5 points)
14. Given the facts that the US imports \$500 billion worth of oil per year, and a price cut in oil generates $(\$100-\$60) * 93\text{million barrels per day} * 365\text{days} = \1.35trillion in savings for the worldwide economy, use your common sense to answer the following questions:

Other things being equal, list and explain at least five industries that will benefit from, five industries that will be hurt, and five currencies that will be hurt by the drop in the price of oil. Also discuss the impact of a drastic drop in the oil price on the economic growth rate, inflation, and interest rate. (6 points)

Part III

15. Please explain the economic rationale of the tender offer made by Robert Campeau to acquire Federated Stores (including Bloomingdales). For simplicity, we assume that the current Federated Stores stock price is \$100 per share. Campeau made a two tier offer: first tier: \$105 until the first 50% are tendered and \$90 for the rest.

However, shareholders get a "blended price". The blended price is determined by the following equation. If X% shares were tendered and $X > 50$, then, the price of each share is

$$105 \cdot 50/X + 90 \cdot (X-50)/X$$

If all shares were tendered (100%), based on the above equation, then shareholders would receive \$97.5 for each share! This is lower than the market price. If the shareholder does not tender his/her shares and if Campeau gets more than 50% of the share, Campeau can bring the company private by paying \$90 (which is considered a fair market value from the US court's point of view) to minority shareholders. If the shareholder does not tender and the bid fails, you may expect the post-tender price to be \$100. If the shareholder tenders and the bid fails (less than 50% are tendered), then, the shareholder gets \$105 per share. Should the shareholder tender his/her shares? Please use whatever analytical tools/models you'd like to illustrate your reasoning and show how the above design could allow Campeau to purchase a company at below market price. (10 points)

Part IV

[請考生耐心做，這題不是考同學背誦現成公式能力，沒學過同學也可以做推導]

In the Republic of Neverland, there are two types of deposits, Super Checking Deposits and Rigid Demand Deposits. Both of them are checkable. The Republic of Neverland Central Bank sets the required reserve ratios at 10% and 20% for Super Checking Deposits and Rigid Demand Deposits, respectively.

When the Republic of Neverland Central Bank supplies the banking system with \$100 in additional reserves, deposits increase by a multiple of this amount.

Suppose First Neverland Bank gained \$100 in additional reserves from selling bonds to the Neverland Central Bank. Then, First Neverland Bank makes \$100 in loans to a borrower who deposits this \$100 in a Super Checking account.

The borrower may use the \$100 to purchase goods and services. When the borrower uses the \$100 by writing checks, the \$100 in reserves leaves First Neverland Bank.

Suppose the \$100 deposit created by First Neverland Bank's loan is deposited in the borrower's Rigid Demand Deposit account at Second Neverland Bank, which keeps no excess reserves.

Remember that the required reserve ratio is 20%, so Second Neverland Bank can make an \$80 loan.

If the borrower then deposits this \$80 in her Super Checking account at Third Neverland Bank, then checkable deposits in the banking system increase. Then, Third Neverland Bank can again make new loans. Fourth Neverland Bank then receives a deposit at one of its Rigid Demand accounts. Namely, the sequence is Super Checking Deposit => Rigid Demand Deposit => Super Checking Deposit => Rigid Demand Deposit ...

16. Suppose this goes on and on and on. If all banks make loans for the full amount of their excess reserves, the initial \$100 increase in reserves will result in \$___ in deposits.

Fill in the blank. Show your calculations. (9%)

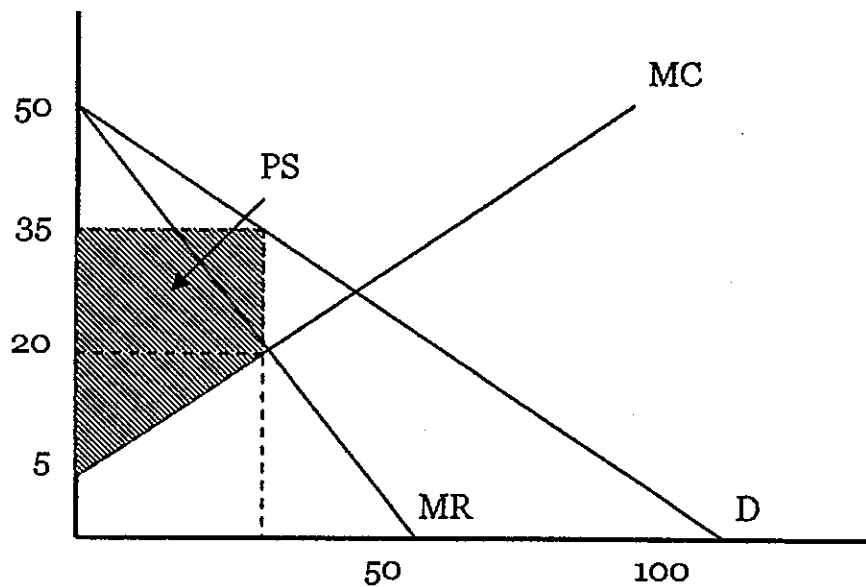
17. If (1) there is no banking system in Neverland and (2) the real GDP growth in Neverland is 2%, a sale of government bonds with a market price of \$100 by the Republic of Neverland Central Bank in the open market will result in a \$___ increase in the money supply.

Fill in the blank. Briefly explain. (3%)

Part V

The demand curve for the sole product of monopolist Luffy is $Q_D = 100 - 2P$.

The marginal cost curve for Luffy is $MC(Q) = 5 + \frac{1}{2}Q$. In the following graph, the Y axis is unit price and X axis is unit sales.



18. Determine the unit price and unit sales that maximize Luffy's profit. (3%)
19. Do you have enough information to calculate its profit at its profit-maximizing unit sales? Briefly explain. (3%)
20. Calculate its producer's surplus at its profit-maximizing unit sales. (3%)
21. As compared with a perfect competition case, determine the social cost, namely, the decrease in total surplus, for the case that the product is monopolized. (3%)
22. Suppose that now the landlord raises the rent on Luffy's production site, increasing the average cost by $\$500/q$, where q is the total output. Determine the resulting unit price and unit sales by which Luffy may maximize its profit. (3%)

※ 本大題請用 2B 鉛筆作答於答案卡，並先詳閱答案卡上之「畫記說明」。

Part VI

選擇 [一題2分；未寫答案不扣分；答案錯誤者扣0.5分]

23. Which of the following would cause the aggregate demand curve to shift to the right? (2%)

- a. an increase in purchases by the central government
- b. an increase in real interest rates
- c. appreciation of the New Taiwan Dollar
- d. a decrease in the money supply
- e. an increase in stock market risk premium

24. If the actual unemployment rate is below the natural rate of unemployment, it would be expected that: (2%)

- a. the rate of inflation would increase
- b. wages would fall
- c. the Phillips curve would shift to the left
- d. the natural rate of unemployment would fall
- e. the depreciable life for fixed assets would increase

25. Which of the following is a tool of expansionary fiscal policy? (2%)

- a. increased taxes
- b. reduced transfers
- c. reduced regulations
- d. increased government purchases of goods and services
- e. reduced subsidies

26. Fiscal incentives to attract businesses from abroad include (2%)

- I tax holidays.
- II accelerated depreciation in the tax code.
- III import duty relief.
- IV lower tax rates for reinvested business profits.
- V increase in minimum wage level

- a. I and II only.
- b. III and IV only.
- c. I, II and III only.
- d. I, II, III and IV.
- e. I, II, III and V.

Part VII. Warranty

Consider the signal model. Consider the case where there is only one firm selling one fridge to one consumer. The fridge is defective with probability θ . If the fridge runs well, the consumer is happy, with utility u ; if it breaks down, he is unhappy, with utility $u - d$. The cost of the fridge is assumed to be zero for simplicity. Hence, if the firm sets the price p for the fridge, its profit is simply p , whereas the consumer's expected utility is $u - \theta d - p$. We also assume the consumer will buy the fridge if his expected utility is greater than or equal to zero. In addition, the firm can provide a warranty, that is, it pays for the repair cost D to fix the fridge if it breaks down. If the firm charges p' for the fridge with a warranty, its expected profit is $p' - \theta D$, whereas the consumer's utility is $u - p'$.

Suppose we have two types of firm, good and bad. Fridges from the good and bad firm will be defective with probability θ_g and θ_b , respectively. However, the firm's type is its private information. The consumer only knows the prior distribution, i.e. the firm is good or bad with probability one-half, but will update his belief after seeing the firm's contract. Hence, the firm can provide contracts to signal its type.

Consider the following separating outcome: The good firm provides warranty service with price $p'_g = u$, whereas the bad firm charges $p'_b = u - \theta_b d$ without warranty. The consumer believes the firm providing the contract with a warranty is the good firm; otherwise, it is the bad firm.

For the following questions, we assume $u = 500$, $d = 100$, $\theta_g = 1/3$, and $\theta_b = 2/3$.

Questions:

27. Does the bad firm have no incentive to mimic the good firm? If so, when? Find the condition(s) with respect to D . If not, why? Explain. (5 points)
28. Can the warranty serve as signal of quality? If so, when? Find the condition(s) with respect to D . If not, why? Explain. (5 points)

Part VIII. Poverty Trap

Consider the Solow growth model. The supply of goods is based on the per-worker production function, which states that output per capita (y_t) depends on the capital stock per capita (k_t) and the total factor productivity (A), where t denotes time.

$$y_t = Ak_t^\alpha \quad (1)$$

The demand for goods comes from consumption per capita (c_t) and investment per capita (i_t):

$$y_t = c_t + i_t \quad (2)$$

We assume that people consume all their income for their basic needs when their income is very low ($y_t \leq \bar{c}$); they start to save a constant fraction (s) of their income when it reaches the basic level (\bar{c}). Hence, the consumption is given by

$$c_t = \begin{cases} y_t & \text{if } y_t \leq \bar{c} \\ \bar{c} + (1-s)(y_t - \bar{c}) & \text{if } y_t > \bar{c} \end{cases} \quad (3)$$

The capital stock is a key determinant and can change over time. At each point in time, investment and depreciation influence the capital stock. Denote δ as the rate of depreciation of capital. Hence, the law of motion for per-capita capital is

$$k_{t+1} = i_t + (1-\delta)k_t \quad (4)$$

We can express the impact of investment and depreciation on the capital stock with the equation:

$$\Delta k = i_t - \delta k_t \quad (5)$$

where Δk is the change in the capital stock between one year and the next.

For the following questions, we assume $A = 20$, $\alpha = 1/2$, $s = 25\%$, $\bar{c} = 240$, and $\delta = 10\%$.

Questions:

29. Graphs the terms of equation (5), investment (i_t) and depreciation (δk_t), as a function of the capital stock per capita (k_t). Draw the two graphs in one figure with capital per capita on the horizontal axis, and investment per capital and depreciation on the vertical axis. (5 points)
30. A steady state of the economy is defined as any level of capital stock k^* such that if the economy finds itself at this level of the capital stock, the capital stock will not change. That is, at k^* , $\Delta k = 0$. Find all the steady-state levels of capital. (5 points)
31. From equation (5), if an economy starts with a capital stock where $i_t > \delta k_t$, therefore $\Delta k > 0$ and thus capital increases. In contrast, if $i_t < \delta k_t$, the capital stock will decrease. Determine to which steady state the economy will converge if an economy starts with $k_0 = 100, 200, 400, 800$, and 1600 , respectively. (5 points)
32. It has been documented that different countries can take very divergent paths to grow, and end up with very different outcomes. Provide a possible explanation for why countries fall into the low-growth trap (so-called poverty trap). (5 points)