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注意：Questions 1~9為選擇題，請填答案卡；Question 10-14題組，請於試卷內依序書寫答案，可以用中文書寫

Questions 1~9 are multiple-choice questions. Choose the best possible answer out of the choices from the list. (1~2 題每題 2 分，3~9 題每題 3 分)

Questions 1~9   United Parcel Service (UPS) and FedEx Corporation (FedEx) are two leading delivery services companies and main competitors to each other. When UPS and FedEx set their pricing strategy, their decisions are based on strategic considerations regarding the behavior of its competitors, such as pricing, output, advertising, investment, etc., and the situation can be highly complicated. A number of researchers have developed analytical models of optimal pricing to understand and explain the firms' behavior.

Suppose there are only two firms, UPS and FedEx, in the industry. The two firms produce a homogeneous good (delivery), and they compete by setting prices simultaneously and consumers want to buy everything from a firm with a lower price. Suppose each of the two firms has fixed costs of $20 and zero variable costs. They face the same demand curves:

UPS's demand $Q_U = 12 - 2P_U + P_F$
FedEx's demand $Q_F = 12 - 2P_F + P_U$
Where P_U refers to UPS's price and P_F refers to FedEx's price.

1. In Nash equilibrium, what is the price UPS will charge?
A) $2
B) $4
C) $6
D) $8

2. If UPS and FedEx can cooperate to maximize the joint profit of the two firms, what is the price FedEx should charge?
A) $2
B) $4
C) $6
D) $8

The holiday season (the month between Thanksgiving and Christmas) is the most important time of the year for logistics companies like UPS and FedEx. During this period, they need to cope with high volumes. Both UPS and FedEx struggle to deliver the surge of packages they receive. Every year, UPS and FedEx are thinking about whether they should add additional surcharges during this peak period. Such higher rates could increase the profits of both firms. However, the profits also depend on the competitor's decisions. Suppose UPS and FedEx make their pricing decisions simultaneously, without any communication. The payoff matrix during the holiday season of UPS and FedEx is as follows:

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FedEx UPS	FedEx Charges $5	FedEx Charges $5.5
UPS Charges $5	$10 $10	$0 $25
UPS Charges $5.5	$25 $0	$15 $15

3. What is UPS's dominant strategy given the payoff matrix?
A) Charging $5
B) Charging $5.5
C) There is no dominant strategy for UPS.

4. In this game, which of the following statements is correct?
A) If UPS and FedEx both play its dominant strategy, joint profits are maximized.
B) If UPS and FedEx both play its dominant strategy, joint profits are not maximized.
C) Neither firm has a dominant strategy.
D) The Nash equilibrium does not exist.

5. Nash equilibrium in this game _____.
A) occurs when both UPS and FedEx charge $5.
B) occurs when both UPS and FedEx charge $5.5.
C) occurs when one firm charges $5 and the other firm charges $5.5.
D) does not exist.

6. Suppose UPS and FedEx face the same payoff matrix every year during the holiday season. That is, the game is repeated. Which of the following statements is correct?
A) UPS's choices are not influenced by FedEx's actions.
B) UPS and FedEx cooperate and achieve the collusive Nash equilibrium for all rounds.
C) UPS and FedEx may cooperate to both charge additional surcharges if the game is played indefinitely.
D) If the game is repeated a finite number of times (T), UPS and FedEx can cooperate until the (T-1) round. At the last round, the two firms will switch to their dominant strategy.

7. According to an article in the Wall Street Journal, neither UPS nor FedEx raised rates during the holiday season of 2014, but both firms did raise them during the 2016 holiday season. Which of the following statements is correct?
A) In 2014, neither firm raised rates during the holiday season because they were at the equilibrium of an infinite repeated game.
B) In 2016, both firms raised rates because they were at the equilibrium of a finite repeated game.
C) In 2016, both firms raised rates because they were competing to attract additional customers.
D) UPS and FedEx set output and price over and over again, continually observing their competitors' behavior and adjusting their own accordingly. This allows them to develop reputations from which trust can arise. As a result, oligopolistic coordination and cooperation can sometimes prevail.

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8. According to a firm analyzing shipping data, both FedEx and UPS' on-time delivery rate dropped during the 2019 holiday season. FedEx's on-time delivery percentage from Black Friday to New Year's Eve was 95%, and UPS' on-time delivery percentage was 97%. Based on this information, what is the probability that if a customer ships ten packages with FedEx during the 2019 holiday season, all of the ten packages arrive on time?

A) 60%
B) 75%
C) 80%
D) 95%

9. Suppose UPS and FedEx plan to improve the on-time delivery rate for the peak period, and the expected payoff matrix for the 2020 holiday season is changed as the following table. Choose all of the Nash equilibrium of this game.

UPS \ FedEx	FedEx Charges $5	FedEx Charges $5.5
UPS Charges $5	$0 / $0	$5 / $20
UPS Charges $5.5	$20 / $5	$10 / $10

(1) Both UPS and FedEx charge $5
(2) Both UPS and FedEx charge $5.5
(3) UPS charges $5 and FedEx charges $5.5
(4) UPS charges $5.5 and FedEx charges $5
(5) Both UPS and FedEx play a mixed strategy, where each firm charges $5 with a probability of 2/3 and charges $5.5 with a probability of 1/3

A) Only (1)
B) Only (2)
C) (3) and (4)
D) (3), (4) & (5)

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*** Questions 10-14 : answer the questions <u>on the answer book.</u>

Question 10

Neverland failed to meet its promise to reduce the emission of greenhouse gases by 2030 by up to 80 percent below the 1990 levels. The imminent European Union (EU) sanction worries the Cabinet of the country. Currently, Neverland's consumption = N\$9, investment = N\$2.5, government spending = N\$2, temporary disposable nominal income = N\$1.5, total taxes = N\$1.5, GDP deflator = N\$2.

Duke Rez said that the EU sanction would hurt the country's exports and that the net export curve would shift from $NX = N\$17 - N\$3\,e$, where e is the number of New Taiwan Dollars required to buy one unit Neverland Dollar, to $NX = N\$14 - N\$3.2\,e$ only because of this piece of bad news.

Duke Dax also stated that the EU sanction would hurt the country's exports. He said that the net export curve would shift from $NX = N\$17 - N\$3\,e$ to $NX = N\$20 - N\$2.5\,e$ only because of this piece of bad news.

[10-1]

One of the only two dukes in Neverland, Duke Rez and Duke Dax, is the true expert in economics. Which one of these two dukes is the true expert in economics? Duke _____ **(Write the name of the duke)** Briefly explain why? **(4%)**

[10-2]

If before EU sanction, $e = 1$, import = N\$8, then net export = ___ ? **(2%)**

[10-3]

Before EU sanction, total output of the Neverland economy = ___ ? nominal GDP = ___ ? real GDP = ___ ? permanent disposable nominal income = ___ ? **(8%)**

[10-4]

Okun's law expert Sir White showed that $u/u = -1/2 \times (X/X - 3\%)$, where u is actual unemployment rate. According to the empirical findings of both Sir White and the duke who is the true expert in economics, the percentage change in Neverland unemployment rate as a result of the EU sanction = ___ ? **(2%)**

[10-5]

Define X for Sir White. **(2%)**

[10-6]

Is Neverland an open economy or a closed economy? Briefly explain why? **(2%)**

[10-7]

Sir Pelleas, the new Prime Minister of Neverland, vows to reduce the emission of greenhouse gases by 2035 by up to 85 percent below the 1990 levels. Sir Lancelot, the Minister of Technology, showed to the members of the Cabinet a newly invented piece of material for glass windows. "The progress of our country's reaction engineering project has been incredible. WINMA, the compound material developed by the project, through the chemical reaction of carbon dioxide replacement, can largely and quickly absorb carbon dioxide in the air."

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Sir Dagonet, the Minister of Environment and Climate Change said, "The project helps significantly reduce the greenhouse effects."

Which of the following Cabinet member's argument most strongly supports Sir Dagonet's argument?

Sir _____'s. **(Write the name of the minister)**   Briefly explain why?   **(5%)**

- Sir Dinadan, the Minister of Economic Affairs, said, "The firms that produce WINMA all incur significant economic losses this year. However, due primarily to both economies of scale and learning effects, the net earnings of companies in the industry will eventually exceed the required earnings."

- Sir Gawain, the Minister of Planning, said, "The per unit materials price of WINMA has been 150% greater than that of tempered glass and 250% greater than that of conventional glass. The former unit price, however, is likely to decrease by at least 70% in two years as more WINMA is used by the construction firms."

- Sir Bors de Ganis, the Minister of National Security, said, "Most glass touchscreens are weakened over time by an accumulation of small scratches and fractures, which eventually contribute to their breaking or shattering when dropped. WINMA, nevertheless, is not subject to such problems and is thus much harder than tempered glass."

- Sir Lionell, the Minister of Statistics and Programme Implementation, said, "According to the historical data, the economic lives of tempered glass and conventional glass products are significantly shorter than those corresponding to WINMA."

- Sir Percival, the Minister of Industry Innovation and Science, said, "During the full process of producing per square feet of WINMA, significantly less fossil fuel is consumed as compared with that corresponding to tempered glass and conventional glass.

- Sir Kay, the Minister of Media, said, " WINMA receives vastly less media coverage than it should have been."

Question 11.

Anita consumes both pizza and Pepsi. The following tables show the amount of utility she obtains from different amounts of these two goods:

Pizza		Pepsi	
Quantity	**Utility**	**Quantity**	**Utility**
4 slices	115	5 cans	63
5 slices	135	6 cans	75
6 slices	154	7 cans	86
7 slices	171	8 cans	96

Suppose Pepsi costs $0.50 per can, pizza costs $1 per slice, and Anita has $9 to spend on food and drink. What combination of pizza and Pepsi will maximize her utility? (10%)

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Question 12.

Suppose that business travelers and vacationers have the following demand for airline tickets from New York to Boston:

Price	Quantity Demanded (business travelers)	Quantity Demanded (vacationers)
$150	2,100 tickets	1,000 tickets
200	2,000	800
250	1,900	600
300	1,800	400

a. As the price of tickets rises from $200 to $250, what is the price elasticity of demand for (i) business travelers and (ii) vacationers? (Use the midpoint method in your calculations.) (10%)

b. Why might vacationers have a different elasticity from business travelers? (5%)

Question 13.

The determinants affecting a nation's competitive advantages and international competitiveness are well studied in economics and business literature. Compare and contrast how this theme has been explored and explained by the following academic works: (1) Ricardo's theory of *comparative advantage,* (2) Heckscher-Ohlin's *factor endowment argument,* and (3) Porter's *diamond model.* (12%)

Question 14.

Sourcing strategy has been a key factor affecting a firm's operating performance, and a firm can choose its own sourcing strategy from various kinds of arrangements, such as *in-house production, spot market purchase,* and *long-term partnership.* (1) Discuss the pros and cons inherent in these three different sourcing strategies, and (2) Explain the conditions most appropriate for each of these three sourcing strategies respectively. (13%)

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