國立中山大學109學年度
碩士暨碩士專班招生考試試題

科目名稱：經濟學【企管系企管甲班碩士班甲組、乙組、丙組】

—作答注意事項—

考試時間：100分鐘

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壹、單選題〈1至10題為中文題，每題4分；11題至18題為英文題，每題5分；總計80分〉

1. 下列何者總體變數是流量變數?
   (A) 10元面額的美鈔
   (B) 儲蓄10元
   (C) 外匯存底
   (D) 存貨

2. 若生產函數為Cobb-Douglas型式時，下列敘述何者不真？
   (A) 此生產函數用來描述廠商的生產效率
   (B)此生產函數具有邊際生產力遞減性質
   (C)此生產函數具有固定規模報酬性質
   (D)當總要素生產力、資本、與勞動同時增加為2倍時，產出也增加為2倍

3. 對借款者(debtor)而言，當(當期)利率下降時，下列何者敘述正確？
   (A) 因所得效果而當期消費增加
   (B) 因所得效果而未來消費減少
   (C) 因替代效果而當期消費減少
   (D) 因替代效果而未來消費增加

4. 長期下，政府增稅使
   (A) 民間儲蓄下降
   (B) 全國儲蓄下降
   (C) 公共儲蓄下降
   (D) 以上皆非

5. 下列有關總體景氣循環典型事實(stylized facts)之敘述何者為真？
   (A) 居住性投資支出為順景氣循環且領先於景氣
   (B) 存貨投資支出為順景氣循環且與景氣同時
   (C) 名目利率為順景氣循環且與景氣同時
   (D) 通貨膨脹為反景氣循環且落後於景氣

6. 下列何者因素有可能會使IS曲線右移？
   (A) 國民所得上升
   (B) 一般物價下跌
   (C) 台股指數下跌
   (D) 預期景氣變差

7. 下列何者因素變動會使LM曲線向右移動?
   (A)貨幣供給緊縮
   (B) 預期通膨加劇
   (C) 一般物價飆高
   (D) 金融市場恐慌

8. 若某國 Phillips Curve 為$\pi=\pi^e-2(u-0.04)$，其中π為通貨膨脹率，π^e為預期通貨膨脹率，u 為失業率；則其自然失業率為：
   (A) 0.02
   (B) 0.04
   (C) 0.06
   (D) 0.08

9. 下列有關外匯市場的敘述何者不真？
   (A) 進口增加使外匯需求增加
   (B) 預期本國通貨升值使外匯供給減少
   (C) 全球每日金融資產的交易金額遠大於產品及勞務的交易金額
   (D) 以上敘述都正確

10. 下列敘述何者不真？
   (A) 封閉經濟體系增加政府購買將使該國投資支出上升
   (B) 資金自由移動下，大型開放經濟體系政府購買的增加將使該國投資支出下降，經常帳餘額下降
   (C) 資金自由移動下，小型開放經濟體系政府購買的增加將使該國投資支出不變，經常帳餘額下降
   (D) 以上敘述都正確

11. The demand for a factor of production will usually be **more elastic** when:
   a. few close substitutes for the factor exist.
   b. the time period under consideration is very short.
   c. demand for the product the factor produces is highly elastic.
   d. the factor's cost is a small part of the final product's total cost of production.

12. In Taiwan, the demand for pork has an own-price elasticity of -0.5, and the cross-price elasticity with respect to the price of chicken of 0.2. The supply for pork has a price elasticity of 1. Assume that a heavy rain causes that the equilibrium price of chicken in Taiwan increases by 3%. What will happen to the equilibrium price of pork in Taiwan?
   a. The equilibrium price will increase by around 0.2%.
   b. The equilibrium price will increase by around 0.4%.
   c. The equilibrium price will increase by around 0.6%.
   d. The equilibrium price will increase by around 1.2%.

13. Assume that two countries V and T can produce both rice and tea. The country V can produce 20 units of rice or 10 units of tea in one month; the country T can produce 25 units of rice or 15 units of tea in one month. If V and T trade to each other, **for the country T**, what is the possible terms of trade?
   a. 5/2
   b. 5/3
   c. 3/5
   d. 1/2

14. Refer to Problem 13. After V and T begin to trade to each other, who will be the victims in this international trade?
    a. The tea farmers in the country V.
    b. The tea farmers in the country T.
    c. The tea consumers in the country V.
    d. The rice consumers in the country T.

15. Many U.S. interstate highways are crowded with traffic, but tolls are not collected even when the highways are crowded. Which of the following is true about this no-toll policy?
    a. It is efficient because interstates are needed to transport goods.
    b. It is efficient because there is no cost of using the interstate once it is built.
    c. It is inefficient because each person's use of the interstate adds to the congestion.
    d. It is inefficient because tolls would increase government revenues, allowing other taxes to be decreased

16. In a perfect competition industry, the long run average cost for each firm is Q^2-4Q+10. The demand in this industry is Q=406-P. In the long run market equilibrium, how many firms will stay in this industry?
    a. 40
    b. 100
    c. 200
    d. 400

17. Assume that the demand for the ethylene in Taiwan is Q=500-(1/4)P. There are two firms in this market: FP and TCT. They compete in quantity (Cournot Game). The **total variable cost** to sell ethylene for FP is $800Q_f+2Q_f^2$, and the **total variable cost** to sell ethylene for TCT is $1000Q_t$. What is the market price in the Nash equilibrium in this market?
    a. 1440
    b. 1360
    c. 1333.33
    d. 1266.67

18. Refer to Problem 17. Assume that the owners of FP and TCT have a secret meeting and want to set a joint monopoly quantity of ethylene in the market. In the meeting, FP suggests that they can set $Q_f = Q_t$, and maximize their total profit. If FP hopes that TCT can accept this suggestion, which of the following is the **minimum amount** FP should pay for the support of TCT?
    a. 1000
    b. 1500
    c. 3000
    d. 6000

貳、填充題〈每小格5分, 共10分; 只需填寫答案〉

1. 若生產函數為$Y = 40 \cdot L - 0.5 \cdot L^2$，其中L為總合就業量；總合勞動供給為 $20 + 3 \cdot w$，其中w為實質工資，則均衡實質工資為__(1)__，均衡就業量__(2)__ 。

參、計算申論題〈共計10分；請簡附計算或推導過程〉

1. 請考慮以下場景。假設今天媽媽有英鎊 10 元要分給兄弟倆人，媽媽先把錢給哥哥，再讓哥哥來決定要分多少錢 (整數) 給弟弟。弟弟在知道會得多少錢後，可以選擇答應或不答應，若弟弟選擇答應，則分到該數字的錢，哥哥得其餘的錢數。若弟弟選擇不答應，則媽媽會取走全部的錢，大家都拿不到半毛。設若在此故事中，哥哥只在意能拿到多少錢，弟弟則不只在意能拿到多少錢，還在意公平的問題。因此，弟弟的效用為 M-K*|5-M|；其中，M 為弟弟能夠分到的錢，|5-M| 為 M 與 5 的距離 (絕對值)，K 則為弟弟對不公平的在意程度，令 K 為 1/2。
   a. 請寫下在此情境中，哥哥與弟弟將如何做決策的擴展型賽局 (extensive form game)。(6 pts)
   b. 請找出此賽局中的所有子賽局完全均衡 (sub-game perfect equilibrium, SPE)。(4 pts)

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※本科目依簡章規定「不可以」使用計算機(問答申論題) 共1頁第1頁

1. 隨著數位經濟的興起，企業也面臨數位化轉型的壓力。一家位於台中的小五金公司，創立三十多年來，在內外銷的市場都表現的不差，從2018年起，公司開始進行數位轉型，包括在生產線開始引進智慧化生產的作法，也找顧問公司建立客戶關係管理(CRM)的系統，同時著手電子商務，期望增加新的銷售管道。然而，在公司內部卻開始產生一種抗拒的現象，不少主管及資深員工採取觀望、被動，甚至不配合的態度。請問有什麼做法，可以降低這種抗拒的現象。(30%，答題不要超過600字)

2. 高雄一家經營美妝產品的公司，一直都以國內市場為主，針對20-35歲消費族群，提供中等價格的產品。有鑑於國內市場規模相對有限，該公司的經營團隊從2019年中開始著手進軍越南市場，越南的人口有九千多萬，國民的平均年齡不到三十歲，是個很具潛力的市場。但是該公司面臨應該如何進入該市場的難題，須在三種方案中評估：
   (1)公司自行進入越南市場，設立獨資的子公司行銷產品
   (2)公司找個適當的的策略夥伴，共同成立一家合資公司行銷產品
   (3)公司不直接投資，而是找個當地的代理商，幫忙行銷產品
   請問：公司應該如何評估這三種進入越南市場的方式？那種方式比較適合這家台灣公司？為什麼？(30%，答題不要超過600字)

3. 請解釋什麼是企業文化，並且說明企業文化對一家企業的經營有什麼重要性。也請用一個熟悉的企業當例子，來詮釋你/妳的論點。(20%，答題不要超過500字)

4. 請利用一個架構來解釋：為什麼不同手機品牌的獲利水準，會有很大的差異，有的品牌毛利在50%以上，有的卻呈現虧損。(20%，答題不要超過500字)

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一、單選題 (70分)：請選擇最適合的答案，每題2分，不倒扣。

1. Which of the following is the most accurate statement regarding managers in today's world?
(A) There is a greater need for customer focus than ever before.
(B) Managers are found almost exclusively in large corporations that have more than 500 employees.
(C) Managers are found almost exclusively in for-profit organizations.
(D) More than half of today's managers are women.

2. To gain a sustainable competitive advantage, a pharmaceutical company might ________.
(A) market aggressively
(B) set high prices for its products
(C) secure exclusive rights to produce a drug
(D) produce as many generic drugs as possible

3. Which of the following is a key difference between managerial and nonmanagerial employees?
(A) Managerial employees receive higher pay compensation.
(B) Nonmanagerial employees have less formal education.
(C) Nonmanagerial employees do not oversee the work of others.
(D) Managerial employees work longer hours.

4. Today, the basic management functions are considered to be ________.
(A) planning, coordinating, leading, and monitoring
(B) planning, organizing, leading, and motivating
(C) commanding, organizing, leading, and decision making
(D) planning, organizing, leading, and controlling

5. Which of the following is NOT considered to be a part of the planning function of a manager?
(A) defining goals
(B) motivating
(C) mapping out strategy
(D) making decisions

6. Non-profit organizations are different from for-profit organizations primarily ________.
(A) in the way make decisions
(B) in the way they measure success
(C) in the way they motivate employees
(D) in how they hire employees

7. Why is innovation a key component of a manager's job in today's business environment?
(A) Innovation keeps employees on their toes.
(B) Innovation gives companies a "fresh" image without changing much real substance.
(C) New approaches are always superior to old approaches.
(D) Innovation gives an organization an edge over its competition.

8. Which of the following factors has contributed to the current view that management is more unethical today than before?
(A) increasing publicity
(B) increasing government standards
(C) decreasing employee morale
(D) changes in shareholder expectations

9. A Coca-Cola bottling plant in Bolivia is wholly owned by a local businessperson. What kind of venture is this plant likely to be?
(A) a franchise
(B) a licensed plant
(C) a foreign subsidiary
(D) a joint venture

10. Which of the following would be likely to be true in a country with a high power distance?
(A) Hundreds of statues, billboards, and posters of the leader would appear all over the capital.
(B) The leader's likeness would appear only in the newspaper from time to time.
(C) Top managers and employees would dress in similar ways.
(D) Rather than employ a driver, top managers would drive their own cars to work.

11. Which of the following is the best example of a company being socially responsive?
(A) meeting hazardous materials standards
(B) giving Christmas bonuses to worthy employees
(C) displaying "think green" posters
(D) building a community day-care center

12. How might a manager with a rights view of ethics view the prospect of forbidding an employee from making what he feels are "misguided" political statements on her non-company website?
(A) The manager would ask the employee to take down the website on the grounds that it violates company policy.
(B) The manager would order the employee to take down the website on the grounds that its positions are foolish and wrong.
(C) The manager would order the employee to take down the website on the grounds that it misrepresents the company.
(D) The manager would not interfere with the website.

13. Which of the following is NOT a typical attempt by management to provide flexibility in the workplace?
(A) benefits for part-time employees
(B) on-site day care
(C) telecommuting
(D) job sharing

14. A manager can faithfully execute the decision-making process but still end up with nothing of value if ________.
(A) he fails to identify the correct problem
(B) he fails to assign number values to different criteria
(C) he solves the problem inefficiently
(D) he fails to correctly identify the steps of the process

15. An organization's resources identify ________.
(A) how the organization gets things done
(B) where the organization operates
(C) when the organization operates
(D) what the organization has

16. An organization's capabilities identify ________.
(A) what the organization knows
(B) who the organization is
(C) assets that the organization can rely on
(D) what the organization can do

17. A salad dressing company that buys a large olive grove to produce olive oil is practicing which of the following?
(A) concentration
(B) forward vertical integration
(C) backward vertical integration
(D) horizontal integration

18. When Google purchased YouTube, a company that featured different, but related products, Google was engaging in which of the following?
(A) concentration
(B) forward vertical integration
(C) backward vertical integration
(D) diversification

19. Which of the following describes a company that is following a focus strategy?
(A) a software company that makes a wide variety of games and financial products
(B) a software company that makes games for a wide audience
(C) a software company that makes financial products for accountants, consumers, and businesses
(D) a software company that makes financial products for accountants only

20. Most successful companies find that ________ a competitive advantage is almost as difficult as developing a competitive advantage.
(A) assessing
(B) sustaining
(C) modifying
(D) eliminating

21. A company's strategic weapon is any product, service, or other attribute it has that ________.
(A) gives it an edge over its competitors
(B) identifies problems that the company has
(C) identifies the potential of employees
(D) helps diversify the company

22. Which goal-setting sequence is correct for the following steps?
1. Evaluate resources.
2. Identify goals.
3. Review the mission and job tasks.
4. Communicate goals.
5. Link rewards to goals.
6. Build feedback mechanisms.
(A) 1, 2, 4, 6, 3, 5
(B) 4, 2, 5, 3, 1, 6
(C) 3, 4, 2, 6, 5, 1
(D) 3, 1, 2, 4, 6, 5

23. All of the following are part of the process of organizational design EXCEPT ________.
(A) deciding how specialized jobs should be
(B) determining rules for employee behavior
(C) determining the level at which decisions are made
(D) determining goals for the organization

24. Which of the following are NOT basic elements of organizational structure?
(A) work specialization, span of control
(B) chain of command, line authority
(C) centralization, decentralization
(D) departmentalization, formalization

25. A company that is pursuing a cost leadership strategy would be most likely to have this kind of structure.
(A) mechanistic
(B) virtual
(C) team
(D) matrix-project

26. All of the following are necessary for successful team structure EXCEPT ________.
(A) well-trained team members
(B) team members with cross-functional skills
(C) team members with years of management experience
(D) a fair and well-run team-based pay plan

27. When a group member in a matrix structure finishes a project, he or she ________.
(A) returns to his or her functional department
(B) stays with the group to take on a new project
(C) enters a pool of available employees from the entire organization
(D) starts looking for a new job

28. Organizational learning can't take place without ________.
(A) complete privacy for employees
(B) a clear chain of command
(C) a shared vision of the future
(D) a stable structure or hierarchy

29. The first step in any employment planning process involves making a ________.
(A) job description
(B) human resource inventory
(C) product evaluation
(D) job specification

30. Which of the following is an example of a structural organizational change?
(A) changing employee attitudes
(B) changing work practices
(C) purchasing new work equipment
(D) changing managerial span of control

31. Because leading is one of the four basic managerial functions, ________ leaders.
   (A) all managers are
   (B) all managers should be
   (C) some managers are
   (D) some managers should be

32. Which communication sequence is correct?
   (A) sender → decoding → channel → encoding → receiver
   (B) sender → channel → medium → decoding → receiver
   (C) source → sender → encoding → decoding → receiver
   (D) sender → encoding → channel → decoding → receiver

33. The value of the controlling function is seen in three specific areas: planning, ________.
   (A) organizing, and leading
   (B) protecting employees, and empowering the workplace
   (C) protecting employees, and protecting the workplace
   (D) empowering employees, and protecting the workplace

34. All of the following are characteristics of value chain management EXCEPT ________.
   (A) it is externally oriented
   (B) it focuses on both incoming materials and outgoing products and services
   (C) it is efficiency oriented
   (D) it is effectiveness oriented

35. Operations managers manage systems that convert inputs into outputs that are sold to customers. Which following statement is true about operations management?
   (A) Operations management involves cost-benefit analysis on sourcing materials, leveraging production costs, matching prices with competitors and customers.
   (B) Operations managers are concerned with planning, organizing, supervising and coordinating production processes, but they do not need involve in supply chain management.
   (C) Operations management, a transformation process of creating value for an organization's competitive success, is unimportant to service organizations because their transformation processes are not as evident as manufacturing organizations.
   (D) Successful people management is irrelevant to operations management, because operations managers are only responsible for planning production processes and controlling in production quality.

二、時事題 (30 分)：請扼要以中文回答，不倒扣。

「共享經濟」是一種去中介、透過互聯網驅動的新商業模式，這個全新的商業模式不僅席捲了全世界，同時也吸引了管理學研究的關注。在網路社群與行動裝置的助力下，各種共享平台如雨後春筍竄出，這些新創的共享平台的商業模式與傳統企業有何異同？其國際化的路徑是否較為快速？面對經常與現行法令衝突、或雙方交易行為難以依現行法律界定責任歸屬，因而引發許多爭端的重重阻礙，共享平台該如何因應？共享經濟是包裹在糖衣下的毒藥，或是拯救經濟的良方？以下節錄 2018 年發表於 Journal of International Management 共享經濟研究架構的論文(Parente, Geleilate & Rong, 2018)，請以此論文為參考文獻回答指定問題。

The sharing economy phenomenon proved to be more than just a frail and temporary trend and has been capable of overturning competition across the globe. Within the wide variety of organizations that have flourished based on the concept of "sharing" underutilized assets, a group of internet-based platform businesses have been thriving in many different industry sectors and internationally. A great deal of attention has been drawn to not only their capacity to raise large amounts of funding, but also to their impressive international expansion. Relying on a virtual platform to conveniently connect users and providers, these firms have achieved instant global adoption, which has resulted in clashes with local competition and regulators. Considering the particular way in which internet-based firms create and capture value, questions on how sharing economy firms formulate and implement internationalization strategies—specifically with regard to local adaptation, internalization, and competitive dynamics—still need to be addressed by the literature.

Global sharing economy firms, such as Uber, Airbnb, Lyft, and WeWork, have achieved impressive results both locally and internationally. These are for-profit organizations that have been undertaking aggressive competitive moves in order to gain market share both in the home country and abroad. Sharing economy firms can be seen as examples of platform capitalism, which consists of intermediary firms relying on data analytics and market coordination to appropriate rent from transactions. Customers also do not engage with sharing economy firms just to experience a new social interaction, but mainly to avoid ownership liabilities and take advantage of lower costs. Despite ongoing debate around the sharing economy term, a definition of it was added to the Oxford English Dictionary in 2015 as follows: "an economic system in which assets or services are shared between private individuals, either free or for a fee, typically by means of the Internet." This definition highlights two important features we use in this study to characterize sharing economy firms: (1) assets or services are shared between individuals for a fee; and (2) transactions are mediated through the internet. We thus set the boundaries of the sharing economy business model around the following three pillars: (1) the business focuses in unlocking the value of unused or underutilized assets; (2) consumers pay for temporary access instead of ownership using an internet-based platform; and (3) it relies on network effects and social interactions between users/suppliers for growth.

There are important implications for theory and practice regarding the effects of the sharing economy on the global economy. The widespread adoption of platform-based businesses across the world is one of the fastest and largest internationalization movement to date. Future research could explore the sharing economy internationalization phenomenon by highlighting the importance of acknowledging business ecosystems across nations. Ecosystems are composed by all relevant stakeholders around a particular business and are constantly evolving as customers' preferences change and technological changes occur. In contrast to traditional global value chains, which are based on single-directed, location-bound flows of input from upstream providers to downstream consumers, ecosystems revolve around a platform or focal firm that connects suppliers and complementary asset providers from different industries and from different locations to consumer-participants in nonlinear ways. Ecosystems are seen as open communities comprising different actors—such as direct suppliers, complementors, regulatory authorities, the judiciary system, and research institutions—that have different roles in the value creation and capture process.

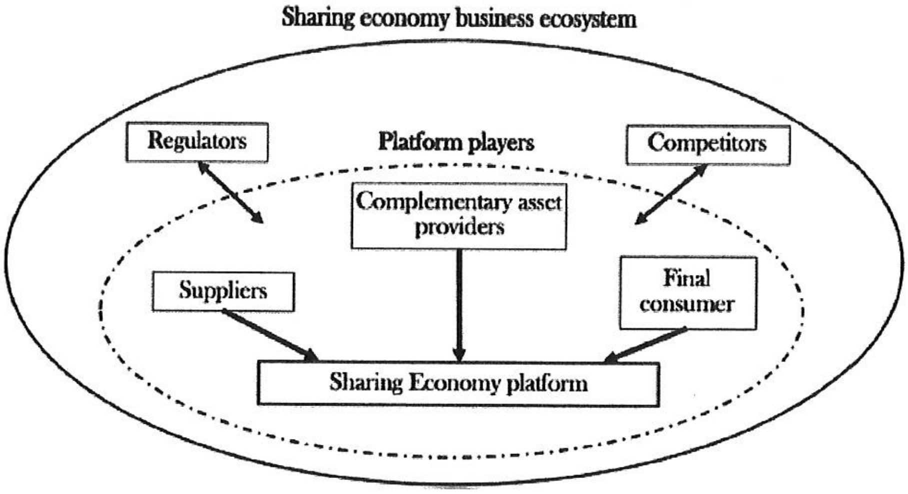

Figure 1. Sharing economy platforms and its main business ecosystem's stakeholders

As we have highlighted, since sharing economy firms do not possess assets to be transferred internationally and ownership advantages can be replicated by competitors, their internationalization relies mainly on their reach for multisided ecosystem players' engagement. According to former Uber executive Mina Radhakrishnan, the global market is seen as a “collection of hundreds of hyperlocal marketplaces,” where each local marketplace has its own ecosystem configuration. In this ecosystem view, the role of complementors from both downstream and upstream sides becomes extremely important in order to spur widespread adoption of the platform. Uber's partnership with important complementors—such as Toyota and the acquisition of maps start-up deCarta—reveal that sharing economy firms' network and integration investments prioritize complementary asset providers. This also indicates that these firms have to strategically “nurture” the ecosystem to enhance growth conditions for local providers, consumers, and complementors in different national ecosystems in order to survive.

1. 請用200字以內中文解釋共享經濟平台的商業模式與特性。(15%)
2. 文章中對於共享經濟平台的國際化路徑的解釋為何? (5%)
3. 請以本文為管理學術基礎，連結實務做法，提出兩項關於共享經濟平台的管理意涵。(10%)

國立中山大學109學年度
碩士暨碩士專班招生考試試題

科目名稱：商用統計學【企管系企管甲班碩士班甲組選考、乙組選考、丙組選考】

—作答注意事項—

考試時間：100分鐘

- **考試開始鈴響前不得翻閱試題，並不得書寫、劃記、作答。**請先檢查答案卷（卡）之應考證號碼、桌角號碼、應試科目是否正確，如有不同立即請監試人員處理。
- **答案卷限用藍、黑色筆(含鉛筆)書寫、繪圖或標示**，可攜帶橡皮擦、無色透明無文字墊板、尺規、修正液（帶）、手錶(未附計算器者)。每人每節限使用一份答案卷，不得另攜帶紙張，請衡酌作答。
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- **試題及答案卷（卡）請務必繳回，未繳回者該科成績以零分計算。**
- **試題採雙面列印，考生應注意試題頁數確實作答。**
- **違規者依本校招生考試試場規則及違規處理辦法處理。**

國立中山大學109學年度碩士暨碩士專班招生考試試題

科目名稱：商用統計學【企管系企管甲班碩士班甲組選考、乙組選考、丙組選考】題號：441002
※本科目依簡章規定「可以」使用計算機（廠牌、功能不拘）（問答申論題）　共2頁第1頁

一、填充題（共20個填空，每一個填空2分，合計40分）

1. Random variable X has a p.d.f. $f(x) = e^{-\pi x^2}$，$-\infty < x < \infty$。Then, the probability distribution of X is（①），and Var（$\sqrt{2\pi}X + 2\pi$) =（②）。

2. Random variable X is hyper-geometric distributed with parameters N, r, n。Then, it can be found that E(X)=（③）, and Var(X) =（④）

3. Random variable X, denoting the number of arrivals within a fixed time length, is a Poisson distribution with Var(X) = 4。Then, the inter-arrival time follows a（⑤）distribution in which μ=（⑥），σ=（⑦）.

4. Two random samples must satisfy three conditions as（⑧），（⑨），（⑩）in order for the sampling distribution of $\frac{s_1^2}{s_2^2}$ to be an F distribution。

5. In hypothesis testing, in order to measure how much the sample evidence is against H_0，we use（⑪）, and have it compared against（⑫）to decide to reject or not to reject H_0.

6. A production process is checked periodically by a quality control inspector. The inspector selects simple random samples of 49 finished products and computes the sample mean product weights $\overline{X}$. If test results over a long period of time show that 5% of the $\overline{X}$ values are over 2.1 kg and 5% are under 1.9 kg, then the mean is（⑬）and the standard deviation is（⑭）for the population of products produced with this process.

7. The current value of a high-tech company is $320 million. If the value of the company 5 years ago was $10 million, the company's mean annual growth rate over the past five years is（⑮）.

8. The desired margin of error for estimating a population proportion in national public opinion polls conducted by organizations such as Gallup and Harris is commonly chosen to be（⑯）.

9. An observation that does not fit the pattern of the other data is called（⑰）.

10. In logistic regression model, the（⑱）measures the impact on the odds of a one-unit increase in only one of the independent variables.

11. In stepwise regression procedure, if the p-value for any independent variable is（⑲）than an α-to-leave (the level of significance for determining whether to remove an independent variable from the model), the independent variable with the（⑳）p-value is removed from the model and the stepwise regression procedure begins a new step.

二、觀念解釋題（共2題；每題10分；合計20分）

1. Please explain why in regression analysis $F = {}^{MSR}/_{MSE}$ is used as the test statistic for F-test of $H_0: \beta_1 = \beta_2 = \cdots = \beta_p = 0$.

2. What is the randomized block design? What advantage can it have over the completely randomized design? Explain.

試題請隨卷繳回，請留意背面是否有題

三、計算題（共2大題；合計40分）

1. Suppose the quarterly sales values for the four years of historical data are as follows.（共5小題，每小題5分；計25分）

Year	Quarter 1	Quarter 2	Quarter 3	Quarter 4
1	4.8	4.1	6.0	6.5
2	5.8	5.2	6.8	7.4
3	6.0	5.6	7.5	7.8
4	6.3	5.9	8.0	8.4

(a) Compute the four-quarter and centered moving average values for this time series.
(b) Compute the seasonal indexes for the four quarters.
(c) De-seasonalize the time series.
(d) The estimated linear trend equation is obtained as $\hat{y} = 5.104 + 0.1476t$, where $\hat{y}$ is the deseasonalized sales and t represents quarter t for t=1, …, 16. Assuming that this equation can be used to develop a trend projection for future quarters, compute the deseasonalized quarterly trend forecasts for the 4 quarters of year 5.
(e) Use the seasonal indexes in part (b) to adjust the de-seasonalized trend forecasts for the four quarters of year 5.

2. In a regression analysis involving 30 observations, the following estimated regression equation was obtained:（共3小題，每小題5分；計15分）

$$\hat{y} = 17.6 + 3.8x_1 - 2.3x_2 + 7.6x_3 + 2.7x_4$$

For this estimated regression equation SST=1805 and SSR=1760.

(a) At $\alpha = 0.05$, test the significance of the relationship among the variables.

Now, suppose that variables x_1 and x_4 are dropped from the model and the following estimated regression equation is obtained:

$$\hat{y} = 11.1 - 3.6x_2 + 8.1x_3$$

For this model SST=1805 and SSR=1705.

(b) Compute SSE(x_1, x_2, x_3, x_4) and SSE(x_2, x_3).
(c) Use an F test and a 0.05 level of significance to determine whether x_1 and x_4 contribute significantly to the model.

Some statistical tabled values are displayed as follow for your computations.
$F_{4, 25; 0.05} = 2.76$; $F_{4, 25; 0.025} = 3.35$; $F_{2, 25; 0.05} = 3.39$; $F_{2, 25; 0.025} = 4.29$
$F_{25, 4; 0.05} = 5.77$; $F_{25, 4; 0.025} = 8.50$; $F_{25, 2; 0.05} = 19.46$; $F_{25, 2; 0.025} = 39.46$

國立中山大學109學年度
碩士暨碩士專班招生考試試題

科目名稱：微積分【企管系企管甲班碩士班甲組選考、乙組選考、丙組選考】

—作答注意事項—

考試時間：100分鐘

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國立中山大學 109 學年度碩士暨碩士專班招生考試試題

科目名稱：微積分【企管系企管甲班碩士班甲組選考、乙組選考、丙組選考】　題號：441003

※本科目依簡章規定「不可以」使用計算機(問答申論題)　共1頁第1頁

請按題號順序作答;並寫出推導過程; 違者扣分

1. Please solve the following questions. 60% (5% each)

   i. Find α such that f(x) is continuous $f(x) = \begin{matrix} \alpha^2 - x^2 & \text{for } x < 0 \\ 2(x-\alpha)^2 & \text{for } x \geq 0 \end{matrix}$

   Find the derivatives $\dfrac{dy}{dx}$ from ii to v.

   ii. $y = u^3$ and $u = \dfrac{1}{(3x-2)}$　　iii. $y = \sqrt[3]{1-x^3}$

   iv. $\sqrt{x} + \sqrt{y} = 5$　　v. $y = \ln x \big/ \sqrt{x}$

   Find the integrations from vi to x.

   vi. $\int_{-1}^{1} (x^3+2)^2 dx$　　vii. $\int \dfrac{dx}{\sqrt{x}(1+\sqrt{x})}$　　viii. $\int e^{1-3x} dx$

   ix $\int \dfrac{\ln x}{x^2} dx$　　x. $\int_0^1 \int_y^{\sqrt{y}} (x+y) dx dy$

   xi. $\lim_{x\to 0} \dfrac{e^x + e^{-x} - 2}{x \sin x}$

   xii . $\dfrac{dy}{dx} = y - 8$, $y(0) = 5$, find the solution of y in terms of x..

2. Sketch the following function; indicate roots, local extrema, inflection point (if any), and concave structure. 15%.

$f(x) = 4x^{1/3} + x^{4/3}$

3 By looking at the Taylor series, decide which of the following functions is largest, which is smallest for small positive θ. 15%

a. $1+\sin\theta$　b. e^θ　c. $\dfrac{1}{\sqrt{1-2\theta}}$

4. 某新產品的消費者年齡分配密度函數如下: 10%

$$p(t) = \begin{cases} 0.015 & for \quad 0 \leq t \leq 40 \\ 0.0263 - 0.00028t & for \quad 40 < t \leq 93.3 \end{cases}$$

請找出年齡的中數(Median) 及平均數 (Mean).