

國立中正大學九十八學年度學士班二年級轉學生招生考試試題

數學系、地球與環境科學系、物理學系、
學系別：化學暨生物化學系、資訊工程學系、經濟學系、科目：微積分
電機工程學系、機械工程學系、通訊工程學系

第 1 節

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★ Write down your answers without calculations in problems 1 ~ 5.

1. Evaluate the following limits:

(a). $\lim_{x \rightarrow 1} \frac{(1 - \sqrt{x})(1 - \sqrt[3]{x})(1 - \sqrt[4]{x})}{(1 - x)^3} = \underline{\hspace{2cm}}$. (5 pts.)

(b). $\lim_{x \rightarrow 0} (e^{3x} + 2x)^{\frac{1}{x}} = \underline{\hspace{2cm}}$. (5 pts.)

(c). $\lim_{n \rightarrow \infty} \left(\frac{1}{\sqrt{n^2 + 1}} + \frac{1}{\sqrt{n^2 + 2}} + \cdots + \frac{1}{\sqrt{n^2 + n}} \right) = \underline{\hspace{2cm}}$. (5 pts.)

(d). $\lim_{n \rightarrow \infty} \frac{1}{n^{p+1}} (1^p + 2^p + \cdots + n^p) = \underline{\hspace{2cm}}$ where $p > 0$. (5 pts.)

2. Suppose that $f(x) = \begin{cases} ax - b & \text{if } x \leq 1 \\ x^3 & \text{if } x > 1 \end{cases}$ is a differentiable function on \mathbb{R} . Then

$\lim_{x \rightarrow 0^+} \frac{1}{x\sqrt{x}} \left(a \tan^{-1} \left(\frac{\sqrt{x}}{a} \right) - b \tan^{-1} \left(\frac{\sqrt{x}}{\sqrt{b}} \right) \right) = \underline{\hspace{2cm}}$. (15 pts.)

3. Let $a_n = \int_0^{\frac{\pi}{2}} (\sin x)^n dx$ where $n \in \mathbb{N} \cup \{0\}$. Then

(a). $\frac{a_n}{a_{n-2}} = \underline{\hspace{2cm}}$ where $n \in \mathbb{N}$ and $n \geq 2$. (10 pts.)

(b). $a_n = \underline{\hspace{2cm}}$ if n is even. (5 pts.)

(c). $a_n = \underline{\hspace{2cm}}$ if n is odd. (5 pts.)

4. Assume that $f(x) = \sqrt{x^3}$. Define $\Gamma = \{(x, f(x)) \in \mathbb{R}^2 \mid 0 \leq x \leq 4\}$ and

$R = \{(x, y) \in \mathbb{R}^2 \mid 0 \leq x \leq 4, 0 \leq y \leq f(x)\}$. Then

(a). The arc length of $\Gamma = \underline{\hspace{2cm}}$. (5 pts.)

(b). The volume of the solid obtained by rotating R about the x -axis is $\underline{\hspace{2cm}}$. (5 pts.)

5. Suppose that $\iint_S \left(\sqrt{\left(\frac{y}{x}\right)^3} + \sqrt{xy} \right) dx dy = \int_{\Gamma} (v^3 + u) \frac{\partial(x, y)}{\partial(u, v)} du dv = A$,

where $S = \{(x, y) \in \mathbb{R}^2 \mid 1 \leq xy \leq 9, 1 \leq y/x \leq 4\}$. Then

(a). $T = \underline{\hspace{2cm}}$. (5 pts.)

(b). $A = \underline{\hspace{2cm}}$. (5 pts.)

6. Show that if a_0, a_1, \dots, a_n are real numbers satisfying

$$\frac{a_0}{1} + \frac{a_1}{2} + \cdots + \frac{a_n}{n+1} = 0,$$

then the equation $a_0 + a_1x + a_2x^2 + \cdots + a_nx^n = 0$ has at least one real root. (10 pts.)

7. Find extrema of $f(x, y, z) = x^3 + y^3 + z^3$ subject to $x^2 + 2y^2 + 3z^2 = 4$. (15 pts.)

第壹部份：個經試題 (50 分)

注意： 第 1~5 題為選擇題 (皆為單選題)，請依照題號順序，將選項寫在答案卷對應題號的空格內；第 1~5 格答對每格 2 分，答錯或未答 0 分。第 A~B 題為問答題，請依照格號順序(第 6~15 格)，將答案寫在答案卷對應的空格內；第 6~15 格答對每格 3 分，答錯或未答 0 分。第 16~17 題為解釋名詞，請將答案寫在答案卷第一頁的下方空白處，並標示清楚題號；第 16、17 題答對每題 5 分。

選擇題

1. 一物品屬於正常財，若需求減少而供給增加，其均衡價格與數量會如何變化？
 - (A) 均衡價格上升，數量增加
 - (B) 均衡價格上升，數量變化不確定
 - (C) 均衡價格下降，數量增加
 - (D) 均衡價格下降，數量變化不確定
2. 有關消費不同財貨的最適組合，下列何者正確？
 - (A) 各商品的總效用皆相等
 - (B) 各商品的邊際效用皆相等
 - (C) 各商品的總效用與邊際效用皆相等
 - (D) 各商品其邊際效用與價格之比皆相等
3. 假設 X 商品的需求函數為 $Q_x = 100 - 4P_x - 2P_y + 0.5I$ ，其中 P 代表 X 商品的價格， P_y 代表另一種商品 Y 的價格，I 為消費者所得。以下何者正確？
 - (A) X 為正常財，且 X 與 Y 為替代品
 - (B) X 為正常財，且 X 與 Y 為互補品
 - (C) X 為劣等財，且 X 與 Y 為替代品
 - (D) X 為劣等財，且 X 與 Y 為互補品
4. 有關邊際成本曲線(MC)與平均成本曲線(ATC)、平均固定成本曲線(AFC)、平均變動成本曲線(AVC)之間的關係，下列何者正確？
 - (A) MC 與 AVC 成平行
 - (B) MC 通過 ATC 與 AFC 的最低點
 - (C) MC 永遠在 ATC 的下方
 - (D) MC 通過 ATC 與 AVC 的最低點

5. 最有可能透過廣告以強化其產品差異性的市場結構類型是：
- (A) 壟斷性競爭市場與獨占市場
 - (B) 壟斷性競爭市場與寡占市場
 - (C) 完全競爭市場與獨占市場
 - (D) 完全競爭市場與寡占市場

問答題

- A. (a) 在完全競爭的市場結構下，假設某商品的需求與供給函數分別為： $D: P = 60 - Q$ ， $S: P = 2Q + 15$ (P 為價格， Q 為數量)，請問其市場均衡價格是多少？____ (6)，生產者剩餘又會是多少？____ (7)
- (b) 延續(a)小題，設若政府對該物品採取價格上限(price ceiling)措施，規定市場上限價格為 35 元，請問市場會出現超額供給還是超額需求？____ (8)；此時的社會總剩餘(社會總福利)之無謂損失(deadweight loss, DWL)會是多少？____ (9)
- B. (a) 若 X 財貨的需求函數為 $Q_x = 100 - P_x$ ，當價格 $P_x = 20$ 時，其對應的 Q_x 為多少？____ (10)；並計算該點的斜率 ____ (11) 及彈性 ____ (12)。
- (b) 假設一獨占廠商面對其壟斷之產品的需求函數是 $P = 15 - 2Q$ ，而總成本函數為 $TC = 4 + 7Q$ 。在沒有任何管制的情況下，廠商在追求利潤最大的原則下，其產品的價格 ____ (13)、數量 ____ (14) 以及利潤 ____ (15) 各會是多少？

解釋名詞

16. 消費者剩餘 (consumer surplus)
17. 差別訂價 (price discrimination)

第貳部份：總經試題 (50 分)

注意： 第 18~22 題為選擇題 (皆為單選題)，請依照題號順序，將選項寫在答案卷對應題號的空格內；第 18~22 格答對每格 2 分，答錯或未答 0 分。第 C~D 題為問答題，請依照題號及格號順序，將答案寫在答案卷所對應的空格內 (第 27 格的答案請另外寫在答案卷的第二頁)；第 23~28 格答對每格 4 分，第 29~30 格答對每格 3 分，答錯或未答 0 分。第 31~32 題為解釋名詞，請將答案寫在答案卷的第二頁，並標示清楚題號；第 31、32 題答對每題 5 分。

選擇題

18. 依據凱因斯的流動性偏好理論(liquidity preference theory)，貨幣需求主要決定於：
- (A)物價與所得 (B)所得與利率
(C)利率與工資 (D)工資與物價。
19. 以下有關貨幣創造乘數之敘述，那些正確？(1)中央銀行的政府存款增加，會使貨幣創造乘數變小 (2)法定存款準備率提高，會使貨幣創造乘數變小 (3)中央銀行提高重貼現率，會緩和貨幣創造作用 (4)現金流失(cash drain)率愈高，會使貨幣創造乘數愈大。
- (A)(1)(2) (B)(2)(3)
(C)(1)(2)(3) (D)(1)(3)(4)
20. 假定存款準備率為 0.25，原始存款為 \$10,000，在其條件下，銀行體系可創造的存款總額為：
- (A)\$25,000 (B)\$30,000
(C)\$35,000 (D)\$40,000
21. 菲律浦曲線(Phillips Curve)是描述何種經濟現象？
- (A)失業率(U)與物價上漲率(P)呈正向相關
(B)U 與 P 呈負向相關
(C)利率(R)與所得水準(Y)呈正向相關
(D)利率(R)與所得水準(Y)呈負向相關

22. 當發生需求拉動的通貨膨脹時，即實際發生的有效需求：
- (A) 超過維持充分就業的有效需求
 - (B) 低於維持充分就業的有效需求
 - (C) 等於維持充分就業的有效需求
 - (D) 與維持充分就業的有效需求無關。

問答題

- C. 依據下列國民所得會計帳的資料(單位：新台幣百億元)，試算出 GNP _____ (23)、NNP _____ (24)、NI _____ (25)、PI _____ (26)，並說明經濟呈現衰退、停滯或成長的原因為何？ _____ (27)
- | | | | |
|---------|-----|---------|----|
| 投資 | 55 | 折舊 | 50 |
| 出口 | 10 | 股息 | 20 |
| 個人可支配所得 | 200 | 進口 | 15 |
| 民間儲蓄 | 20 | 企業間接稅淨額 | 20 |
| 政府支出 | 90 | 個人所得稅 | 45 |
| 社會安全支付 | 25 | | |

- D. 下表為本國與外國一單位勞動之米與布的產出：

	米	布
本國	1000	5000
外國	200	2000

- (1) 試問本國對於何種商品具有絕對利益？ _____ (28)
(2) 外國與本國分別會出口何種商品(依照比較利益)？ _____ (29)、 _____ (30)

解釋名詞

31. 乘數效果 (Multiplier Effect)
32. 停滯性通貨膨脹 (Stagflation)

I. Each of the sentences below includes an English error. Choose the underlined portion that has the mistake (10%--2 points for each correct answer).

Example:

I are tired, but I will study anyway.

(A) are

(B) but

(C) will

(D) anyway

In this case, we should choose (A) since *I are tired* is incorrect; the sentence should read *I am tired, but I will study anyway*.

1. Popular belief in the United States is that an early life of hardship and poverty made Abraham Lincoln to be the great leader he was.
 - a. an early
 - b. made
 - c. to be
 - d. he was
2. The architecture exhibited in the Empire State Building conveys an idea of the prevailing attitudes is important for the historical and cultural value the building represents.
 - a. conveyed
 - b. prevailing
 - c. is
 - d. represents
3. In 2001 George W. Bush, Jr., entered his first year office as President of the United States.
 - a. In 2001
 - b. entered
 - c. office
 - d. as President
4. Similar in climate and geography as northeastern cities is Portland, the largest city in Oregon.
 - a. in
 - b. as
 - c. is
 - d. largest
5. Because of extensive research in the field of genetic engineers, scientists can now create plants that farmers can grow in harsh climates.
 - a. research
 - b. engineers
 - c. farmers
 - d. harsh

II. Choose the answer choice that best completes the sentence (10%--2 points for each correct answer)

Example:

I _____ tired, but I will study anyway.

- (A) is
- (B) being
- (C) am
- (D) to be

In this case, we should choose (C) since the sentence should read *I am tired, but I will study anyway.*

1. According to the scientific method, a scientist must consider _____ outcome.
 - a. any outcome and to be a possible
 - b. any outcome and the possible
 - c. any outcome a possibility
 - d. any outcome a possible
2. After her death in 1986 many documentaries _____ Georgia O'Keeffe were produced.
 - a. related the life and work of
 - b. to relate life and work
 - c. life and working to relate
 - d. relating the life and work of
3. _____ the passage of light, many new plastics are processed using technologies rivaling those used in the manufacture of computer chips.
 - a. To better permit
 - b. Permitting better
 - c. For the better of
 - d. It is better for
4. Uranium, _____, is an exceedingly rare and potentially dangerous element.
 - a. to found in trace quantities
 - b. found in trace quantities
 - c. finding in trace quantities
 - d. to be found in trace quantities
5. The Flower Market in San Francisco is _____, and was established in the 1930's.
 - a. home to the country's second largest flower market
 - b. home of the second largest flower market in the country
 - c. the second flower market in the country's home of
 - d. the home to the second country's large flower market

III. Choose the best answer for each sentence below (10%--1 point for each correct answer).

1. Many students have come to rely _____ the Internet for information.
 - a. at
 - b. in
 - c. on
 - d. by
2. Any experienced captain will learn to depend _____ her crew to keep her ship in order.
 - a. of
 - b. at
 - c. on
 - d. with
3. Because the Amazon rain forest is teeming _____ life, it is considered to be one of the most important ecological environments in the world.
 - a. with
 - b. of
 - c. for
 - d. on
4. One criticism of some well-established corporations that continues even today is that they profited _____ violations of human rights in the past.
 - a. against
 - b. in
 - c. from
 - d. to
5. Fortunately, an appeal _____ limited use of air conditioning during the heat wave was accepted, and no power shortages were reported.
 - a. of
 - b. for
 - c. by
 - d. around
6. To qualify _____ the position of President of the United States of America, one must be at least 35 years old.
 - a. of
 - b. in
 - c. from
 - d. for
7. Believers in pacifism believe that there is never a good reason to resort _____ violence.
 - a. to
 - b. from
 - c. in
 - d. on

8. The air we breathe consists _____ nitrogen, oxygen, carbon dioxide, and trace amounts of several other gases.
- a. from
 - b. for
 - c. of
 - d. by
9. It is difficult to decide _____ a university to apply to because you cannot really know the quality until you attend.
- a. to
 - b. on
 - c. in
 - d. for
10. If a person does not get enough calcium in their diet, she risks suffering _____ debilitating bone disorders when she gets older.
- a. of
 - b. to
 - c. under
 - d. from

IV. Choose the correct definition (20%--2 points for each correct answer).

1. "I'm beat!" means that I feel very _____.
- a. angry
 - b. tired
 - c. nervous
2. "I'll be in touch" means that I'll _____ later.
- a. contact you
 - b. meet you
 - c. visit you
3. "Uh-huh" is a very informal way of saying _____.
- a. I don't know
 - b. maybe
 - c. yes
4. If someone answers a question by saying, "Beats me," he/she means that _____.
- a. he/she thinks the question is stupid
 - b. he/she doesn't understand you
 - c. he/she doesn't know the answer
5. People say, "Chin up!" when they want to _____ someone.
- a. criticize
 - b. warn
 - c. encourage
6. When someone says, "I see where you're coming from," his/her meaning is _____.
- a. "I know where you live."
 - b. "I understand your thinking/reasons."
 - c. "I can guess your nationality."

7. If you give your opinion on something and hear the response "Well, to each his own," the person you are speaking to _____.
- doesn't agree, but is too polite to say so
 - thinks your idea is creative and original
 - wants you to explain in more detail
8. "Don't look a gift horse in the mouth" means that you _____ something that's given to you.
- shouldn't appear too eager to accept
 - should be very suspicious of
 - shouldn't be too critical of
9. If someone "has a short fuse," he or she _____.
- is easy to upset and make angry
 - can't concentrate for a very long period of time
 - never has a strong opinion about anything
10. If someone says he/she has had "one of those days," he/she means that the day has been _____.
- so normal that it was boring
 - busy, unpredictable, and frustrating
 - full of unexpected (but pleasant) surprises

V. Reading Comprehension (20%--4 points for each correct answer)

Read the following story and then answer the questions about it below.

Three years ago on the last day of January, I had a big problem. I'll never forget that day. The story began when my uncle, my cousin, and I went into the desert. My uncle was the oldest at 72 years, but he was still strong. My cousin was 10 years old, and I was 25. All of us liked hunting. Usually we went on the weekend, especially in winter, because that was the hunting season.

On the 25th of January, we readied everything in the car, a Range Rover with four-wheel drive. We started out in the afternoon and drove for three hours. We reached the place we were looking for at 5:15. First, we set up the tent, then we made coffee and had a few minutes of rest. After that, we left to go hunting, using a falcon to help us find and capture birds and rabbits. We spent two hours without finding anything, so we decided to go back to camp. On our way back, my cousin saw a rabbit and cried, "Rabbit!! Rabbit! Quick!" I quickly took the falcon's head cover off and flung it away. When the rabbit saw the falcon, it took off fast, but my falcon was a professional hunter. He flew up and then dropped back down to trick the rabbit, catching him in less than two minutes. We took it and went back to the camp where we started to cook our dinner. We ate some delicious food, drank Arabic coffee, and sat around the fire talking until 10:30 P.M. Then we went to bed.

We left camp the next morning at 7 o'clock, heading north where we found and caught two kinds of birds. However, we ran into trouble at about 10:00 A.M. because the car got stuck in the sand! We spent about three hours trying to pull it out with no success. Finally, we decided to walk. I talked with my uncle about how hard it would be for an old man and young boy to walk more than 40 km. in the desert. He agreed, so I took a bottle of water and began to walk south alone. I knew the way well, but it was a long way to go in the sand. I walked more than four hours without stopping though I felt increasingly tired and thirsty. I drank all the water from the bottle then finally stopped to rest, sleeping for about two hours.

When I got up, darkness had covered the area. "What should I do?" I asked myself then decided I should keep moving south. I was worried about my uncle and cousin and learned later that they were also worried about me. Suddenly, I met a Bedouin man riding a camel who invited me to his house. After resting for awhile I asked him to take me to the road, which he did. Once there, I was able to catch a ride to the city to get help. It took another day to get back to my uncle and cousin and bring them to safety.

I learned a lesson from this story, which was that the desert can be very dangerous. Next time, when we go hunting, we'll go in a larger group with two or more cars. That way, we can keep each other safe. Although we know the desert is dangerous, we won't give up hunting there.

Circle the correct answer.

1. Which of the following is NOT true?
 - a. Saeed's uncle was over 70 years old.
 - b. Saeed was younger than his uncle and his cousin.
 - c. Three males went hunting.
 - d. Winter is the hunting season, so they went hunting in January.
 - e. Saeed's uncle was an old, but strong man.

2. Choose the correct answer.
 - a. The Range Rover had front-wheel drive.
 - b. The group left for the hunting trip at 2:15 P.M.
 - c. After resting, they set up their tent.
 - d. During the first two hours, the group found several animals to hunt.
 - e. The rabbit tricked the falcon.

3. Which is NOT a reason that Saeed had to walk forty km.?
 - a. The car got stuck in the sand.
 - b. It was hard for an old man or a very young boy to walk 40 km.
 - c. Saeed did not know the way and he became lost.
 - d. The group spent 3 hours trying to pull the car out of the sand but failed.
 - e. There was nobody around to help the hunters get out of the sand.

4. Which is NOT true about the Bedouin man?
 - a. He was riding a camel.
 - b. He took Saeed to get help.
 - c. He took Saeed to his house.
 - d. He allowed Saeed to rest.
 - e. He took Saeed to the road.

5. What lesson did Saeed learn from his experience?
 - a. Hunting is dangerous and he will not hunt again.
 - b. When hunting, Saeed will use a different type of car.
 - c. When hunting in the desert, people should go in groups with two or more cars.
 - d. Bedouins are not helpful to strangers in the desert.

VI. Essay (30%)

Write an essay of 200-300 words explaining why you like studying English. Include specific examples and explanations.