

# 國立中山大學 101 學年度碩士暨碩士專班招生考試試題

科目：普通生物學【海資系碩士班甲組選考】

題號：4149  
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## 一、簡答題：（每題三分；25 題共 75 分）

- (1) What is the main source of energy for producers in an ecosystem?
- (2) The precise weight of a mole of some pure elements like silicon (Si) can vary slightly from the standard atomic mass, or even from sample to sample. Why?
- (3) You have two beakers. One contains a solution of HCl at pH = 1.0. The other contains a solution of NaOH at pH = 13. Into a third beaker, you slowly and cautiously pour 20 mL of the HCl and 20 mL of the NaOH. After complete stirring, the pH of the mixture will be?
- (4) Where are all components of thylakoids, DNA, and ribosomes found?
- (5) A number of systems for pumping ions across membranes are powered by ATP. Such ATP-powered pumps are often called ATPases although they don't often hydrolyze ATP unless they are simultaneously transporting ions. Because small increases in calcium ions in the cytosol can trigger a number of different intracellular reactions, cells keep the cytosolic calcium concentration quite low under normal conditions, using ATP-powered calcium pumps. For example, muscle cells transport calcium from the cytosol into the membranous system called the sarcoplasmic reticulum (SR). If a resting muscle cell's cytosol has a free calcium ion concentration of  $10^{-7}$  M while the concentration in the SR is  $10^{-2}$  M, then how is the ATPase acting?
- (6) What is Meiosis II similar to mitosis?
- (7) *Drosophila* (fruit flies) usually have long wings (+) but mutations in two different genes can result in bent wings (bt) or vestigial wings (vg). If a homozygous bent wing fly is mated with a homozygous vestigial wing fly, what kind of offspring would you expect?
- (8) The same gene that causes various coat patterns in wild and domesticated cats also causes the cross-eyed condition in these cats, the cross-eyed condition being slightly maladaptive. In a hypothetical environment, the coat pattern that is associated with crossed eyes is highly adaptive, with the result that both the coat pattern and the cross-eyed condition increase in a feline population over time. What conceptual statement is supported by these observations?
- (9) When male horses (stallions) and female donkeys (jennets) mate, they produce a sterile hybrid called a hinny. Hinnies occur much less frequently than do mules, but are just as healthy and robust as mules. Logically, what best accounts for the relative rarity of hinnies, and what kind of prezygotic isolating mechanism is at work here?
- (10) What is the term to describe an organism that obtains both carbon and energy by ingesting prey.

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- (11) You are designing an artificial drug-delivery "cell" that can penetrate animal cells. Which of the protist structures should provide the most likely avenue for research along these lines?
- (12) What are Acoelomates characterized by?
- (13) What are the excretory organs of annelids?
- (14) A new species of aquatic chordate is discovered that closely resembles an ancient form. It has the following characteristics: external armor of bony plates, no paired lateral fins, and a suspension-feeding mode of nutrition. In addition to these, what characteristics it will not probably have?
- (15) You have a freshly prepared 0.1 M solution of glucose in water. Each liter of this solution contains how many glucose molecules?
- (16) Plasmodesmata in plant cells are most similar in function to which structures in animal cells?
- (17) Two true-breeding stocks of pea plants are crossed. One parent has red, axial flowers and the other has white, terminal flowers; all F1 individuals have red, axial flowers. The genes for flower color and location assort independently. If 1000 F2 offspring resulted from the cross, approximately how many of them would you expect to have red, terminal flowers?
- (18) A man who is an achondroplastic dwarf with normal vision marries a color-blind woman of normal height. The man's father was 6 feet tall, and both the woman's parents were of average height. Achondroplastic dwarfism is autosomal dominant, and red-green color blindness is X-linked recessive. How many of their daughters might be expected to be color-blind dwarfs?
- (19) A proficient engineer can easily design skeletal structures that are more functional than those currently found in the forelimbs of such diverse mammals as horses, whales, and bats. The actual forelimbs of these mammals do not seem to be optimally arranged, why?
- (20) You are confronted with a box of preserved grasshoppers of various species that are new to science and have not been described. Your assignment is to separate them into species. There is no accompanying information as to where or when they were collected. Which species concept will you have to use?
- (21) The common ancestors of birds and mammals were very early (stem) reptiles, which almost certainly possessed three-chambered hearts (two atria, one ventricle). Birds and mammals, however, are alike in having four-chambered hearts (two atria, two ventricles). What is the best description for the four-chambered hearts of birds and mammals?

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- (22) When pathogenic fungi are found growing on the roots of grape vines, grape farmers sometimes respond by covering the ground around their vines with plastic sheeting and pumping a gaseous fungicide into the soil. What should be the most important concern of grape farmers who engage in this practice?
- (23) What distinguishes complete metamorphosis from incomplete metamorphosis in insects?
- (24) Why is the amniotic egg considered an important evolutionary breakthrough?
- (25) A water sample from a hot thermal vent contained a single-celled organism that had a cell wall but lacked a nucleus. What is its most likely classification?

## 二、翻譯題（英文翻譯成中文）（25 分）

The herpes viruses are very important enveloped DNA viruses that cause disease in all vertebrate species and in some invertebrates such as oysters. Some of the human ones are herpes simplex (HSV) I and II, causing facial and genital lesions, and the varicella-zoster (VSV), causing chicken pox and shingles. Each of these three actively infects nervous tissue. Primary infections are fairly mild, but the virus is not then cleared from the host; rather, viral genomes are maintained in cells in a latent phase. The virus can then reactivate, replicate again, and be infectious to others. In electron micrographs of HSV infection, it can be seen that the intact virus initially reacts with cell surface proteoglycans, then with specific receptors. This is later followed by viral capsids docking with nuclear pores. Afterward, the capsids go from being full to being "empty." The viral envelope mediates entry into the cell, the capsid entry into the nuclear membrane, and the genome is all that enters the nucleus.

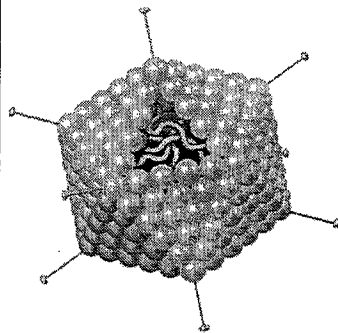
# 國立中山大學 101 學年度碩士暨碩士專班招生考試試題

科目：分子生物學【海資系碩士班甲組選考】

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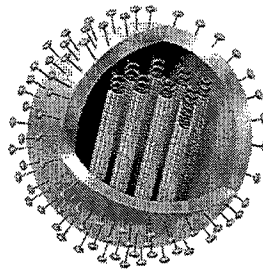
## 一、簡答題：(每題 5 分；12 題共 60 分)

- (1) After completion of their model that the DNA molecule could carry a vast amount of hereditary information, in which of what became apparent to Watson and Crick?
- (2) What is the structural level of a protein least affected by a disruption in hydrogen bonding?
- (3) Besides the ability of some cancer cells to over-proliferate, what else could logically result in a tumor?
- (4) Use these photos to answer the following question:



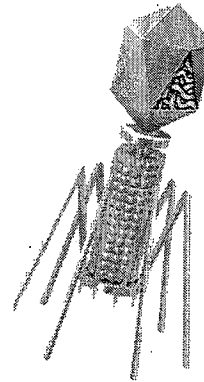
70-90 nm (diameter)

I.



80-200 nm (diameter)

II.



80 x 225 nm

III.

Which of the three types of viruses shown above would you expect to include a capsid(s)?

- (5) Suppose you are provided with an actively dividing culture of *E. coli* bacteria to which radioactive thymine has been added. What would happen if a cell replicates once in the presence of this radioactive base?
- (6) Which functional groups are involved in hydrogen bonds?
- (7) If one strand of a DNA molecule has the sequence of bases 5'ATTGCA3', what is the sequence of the other complementary strand?
- (8) How many molecules of water are needed to completely hydrolyze a polymer that is 11 monomers long?
- (9) Which are nitrogenous bases of the purine type?
- (10) Accuracy in the translation of mRNA into the primary structure of a polypeptide depends on what kind of specificity?

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(11) What is a ribozyme?

(12) In recombinant DNA methods, what does the term "vector" refer to?

二、問答題：(每題 10 分；兩題共 20 分)

(1) RNA polymerase in a prokaryote is composed of several subunits. Most of these subunits are the same for the transcription of any gene, but one, known as sigma, varies considerably. What are the probable advantages for the organism of such sigma switching?

(2) When will be the lactose operon likely to be transcribed?

三、翻譯題(英文翻譯成中文) (20 分)

Recent genetic studies in the budding yeast *S. cerevisiae* have led to the model for how the APC regulates sister chromatid separation to initiate anaphase. Cohesin SMC proteins bind to each sister chromatid; other subunits of cohesin, including *Sccl*, then link the SMC proteins, firmly associating the two chromatids. The cross-linking activity of cohesin depends on *securin*, which is found in all eukaryotes. Prior to anaphase, securin binds to and inhibits separase, a ubiquitous protease related to the caspase proteases that regulate programmed cell death. Once all chromosome kinetochores have attached to spindle microtubules, the APC is directed by a specificity factor called *Cdc20* to polyubiquitinate *securin*, leading to the onset of anaphase. (This specificity factor is distinct from *Cdh1*, which directs the APC to polyubiquitinate B-type cyclins.) Polyubiquitinated securin is rapidly degraded by proteasomes, thereby releasing separase. Free from its inhibitor, separase cleaves *Sccl*, breaking the protein cross-link between sister chromatids. Once this link is broken, the poleward force exerted on kinetochores can move sister chromatids toward the opposite spindle poles.



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科目：有機化學【海資系碩士班丁組】

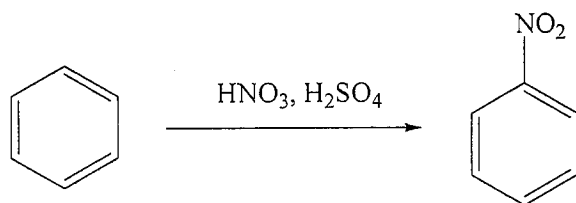
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1. Give structures of the following compounds (20%, 2% each)

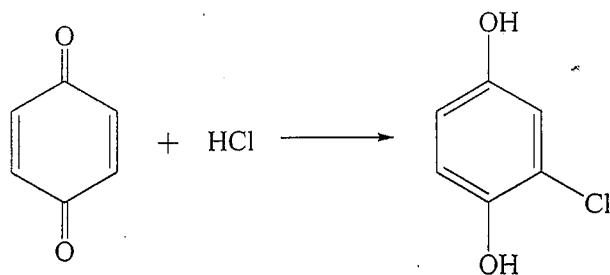
- a. Succinic anhydride
- b. (Z)-3-Methyl-2-hexenoic acid
- c. Methyl 2-aminobenzoate
- d. *m*-Chlorostyrene
- e. 4-Ethoxypyridine
- f. Methyl vinyl ketone
- g. *m*-Chloroaniline
- h. Ethyl acetoacetate
- i. *p*-Toluenesulfonyl chloride
- j. Benzenesulfonic acid

2. Give a mechanism for each reaction. (42%, 7% each)

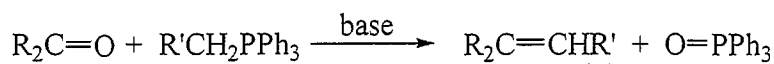
a.



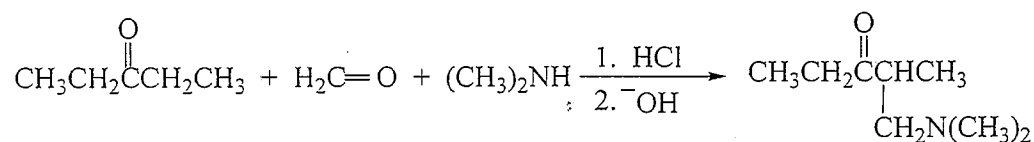
b.



c.



d.

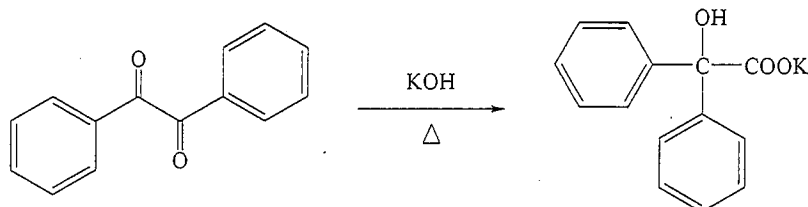


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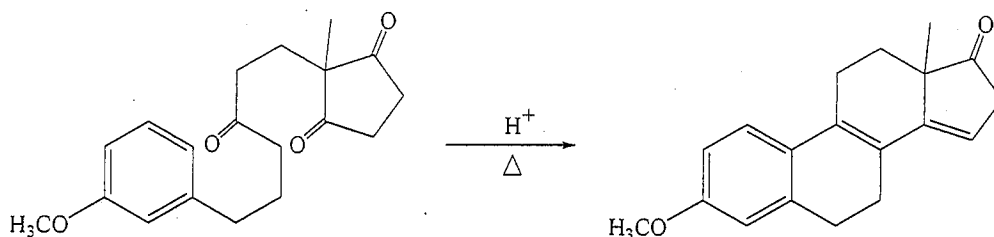
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e.



f.



3. Determine the structure for each compound with the provided molecular formula (or molecular weight) and spectroscopic data. (38%)

a.  $C_{15}H_{20}O_4$  :  $^1H$  NMR  $\delta$  0.8 (t, 3H), 1.2 (t, 6H), 2.3 (q, 2H), 4.2 (q, 4H) and 7.3 (s, 5H) ppm (7%)

b.  $C_5H_{12}O$  :  $^1H$  NMR  $\delta$  1.0 (s, 9H), 3.0 (s, 1H) and 3.3 (s, 2H) ppm (5%)

c. Molecular weight: 152

IR  $\nu_{max}$  3497 and 1686 (s)  $cm^{-1}$

$^1H$  NMR  $\delta$  3.9 (s, 3H), 6.5 (br s, 1H), 6.9–7.5 (m, 3H) and 9.8 (s, 1H) ppm (7%)

d.  $C_{10}H_{12}O_2$

IR  $\nu_{max}$  1745 (s)  $cm^{-1}$

$^1H$  NMR  $\delta$  2.0 (s, 3H), 2.9 (t, 2H), 4.3 (t, 2H) and 7.3 (s, 5H) ppm (6%)

e. Molecular weight: 88

IR  $\nu_{max}$  3430 and 1718  $cm^{-1}$

$^1H$  NMR  $\delta$  1.4 (d,  $J = 7$  Hz, 3H), 2.2 (s, 3H), 3.7 (br s, 1H) and 4.2 (q,  $J = 7$  Hz, 1H) ppm (6%)

f.  $C_6H_5NCl_2$

IR  $\nu_{max}$  3432 and 3313  $cm^{-1}$

$^1H$  NMR  $\delta$  4.4 (br s, 2H), 6.6 (t, 1H) and 7.2 (d, 2H) ppm (7%)



# 國立中山大學 101 學年度碩士暨碩士專班招生考試試題

科目：生理學【海資系碩士班甲組選考】

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## 問答題 (請勿於題目卷上作答)

- 一、何謂生理時鐘？(5分)  
詳述生理時鐘的形成與控管機制(25分)
- 二、詳述神經細胞興奮，誘發骨骼肌收縮的生理機制，意即詳述 Neuromuscular junction 的詳細生理機制(30分)
- 三、詳述人體血壓的生理控管機制(30分)
- 四、試述生理學與生物學發展演進的相關性(10分)

# 國立中山大學 101 學年度碩士暨碩士專班招生考試試題

科目：分析化學【海資系碩士班丁組】

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請注意：考題中若涉及計算，請將演算過程列出，否則不予計分。

1. What is the relation between the standard deviation and the precision of a procedure? (3%)  
What is the relation between standard deviation and accuracy? (3%)
2.  $K_a$  for acetic acid is  $2 \times 10^{-5}$ . Find  $K_b$  for acetate ion. (10%)
3. What is the difference between a direct titration and a back titration? (10%)
4. Calculate the pH of (a) 0.2M HCl, (3%) (b) 0.2M acetic acid ( $K_a=2 \times 10^{-5}$ ). (3%)
5. The acid HA has  $pK_a=7.00$ .  
(a) Which is the principal species, HA or  $A^-$ , at pH6.00? Explain your answer. (5%)  
(b) Which is the principal species at pH8.00? Explain your answer. (5%)  
(c) What is the quotient  $[A^-] / [HA]$  at pH7.00? (5%)
6. Define each of the following :  
(a) half-reaction, (3%)  
(b) oxidation-reduction couple, (3%)  
(c) standard electrode potential, (3%)  
(d) indicator electrode, (3%)  
(e) reference electrode. (3%)
7. In iodometry, the starch indicator is not added until just before the end point. Why? (10%)
8. What is the difference between a galvanic cell and an electrolysis cell? (10%)
9. The absorbance of a  $2.31 \times 10^{-5}$ M solution of a compound is 0.822 at a wavelength of 266nm in a 10-cm cell. Calculate the molar absorptivity at 266nm. (10%)
10. Why do some absorbing compounds fluoresce and others not? (4%)  
What structural features appear to favor fluorescence? (4%)

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I. (5%) Indicate whether each of the following pairs of sugars consists of

(a) anomers, (b) epimers, or (c) an aldose-ketose pairs

- ( ) 1. D-glucose and D-mannose
- ( ) 2. D-glyceraldehyde and dihydroxyacetone
- ( ) 3.  $\alpha$ -D-glucose and  $\beta$ -D-glucose.
- ( ) 4. D-glucose and D-fructose.
- ( ) 5. D-galactose and D-glucose.

II. (5%) Match the catabolic products in the right column with the amino acids in the left column from which they can be derived.

- |                   |                            |
|-------------------|----------------------------|
| 1. ( ) Alanine    | a. $\alpha$ -Ketoglutarate |
| 2. ( ) Aspartate  | b. Pyruvate                |
| 3. ( ) Isoleucine | c. Oxaloacetate            |
| 4. ( ) Glutamine  | d. Succinyl-CoA            |
| 5. ( ) Serine     |                            |

III. (30%) Explain the following terms:

1. glycobiology:
2. primary structure of proteins:
3. proteomes:
4. SDS-PAGE:
5. transcription:
6. Western Blotting:
7. Z scheme of photosynthesis:
8. rubisco:
9. glucogenic amino acids:
10. acetyl CoA carboxylase:

IV. 問答題：

1. (4%) What are the minimal requirements for DNA replication?
2. (3%) Explain briefly how enzymes accelerate the rate of reactions.
3. (2%) The sequence 6 bp restriction cleavage site for EcoRV is GATXXX. What is the complete sequence of the double stranded restriction site?
4. Draw the structure:  
(1) (3%)  $\alpha$ -D-Glucopyranose:                      (2). (3%)  $\beta$ -D-Ribofuranose :
5. (10%) Give the name, three, one-letter abbreviation and draw the structure of the following amino acids: negative charged at neutral pH .

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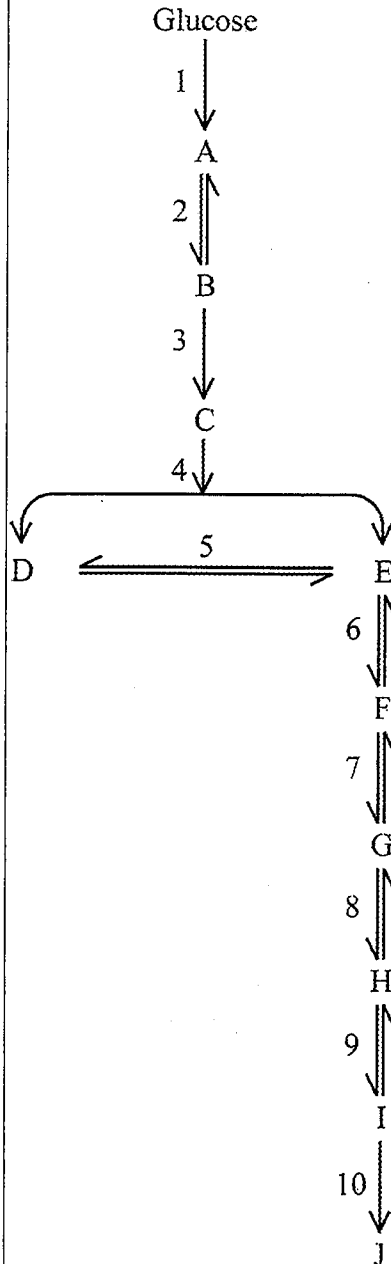
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6. (23%) (1) Name A, B, C, D, E, F, G, H, I, J of the intermediates in glycolysis pathway. (A~J 請寫英文全名)

(2) Name the enzymes of step 1~ 10 (請寫英文全名)

(3) Which steps 消耗 ATP? 產生 ATP? 產生 NADH?



7. (6%) The ATP Synthase of chloroplast closely resembles those of mitochondria. Please compare the photosynthesis and oxidative phosphorylation.

8. (2%) What are the two products of the “light reactions” needed in order for the Calvin cycle to function?

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9. (4%) Calculate the number of mole of ATP that could be produced from the complete oxidation of one mole Arachidate ( $C_{20:0}$ ), by an aerobic organism. Show your work clearly.

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共五題，每題 20 分。答題時，每題都必須寫下題號與詳細步驟。  
請依題號順序作答，不會作答題目請寫下題號並留空白。

1. 美國〈消費者報導〉雜誌報導了以下 17 個品牌單根熱狗的卡路里含量：

173 191 182 190 172 147 146 139 175  
136 179 153 107 195 135 140 138

畫其莖葉圖並找出五數綜合包括：最小數、第一四分位數、中位數、第三四分位數及最數。從莖葉圖可以看出一些有關分布的重要訊息，是從綜合數值中看不出來的，請問是些訊息？

2. (a) 隨機變數  $X$  與  $Y$  的聯合機率分配  $P(X = x, Y = y)$  為：

|         |         |         |         |
|---------|---------|---------|---------|
|         | $x = 0$ | $x = 1$ | $x = 2$ |
| $y = 0$ | 0       | 0.2     | 0.4     |
| $y = 1$ | 0.4     | 0       | 0       |

則  $X$  與  $Y$  的相關係數為何？

- (b) 一作業系統每週發生故障之次數的機率分配為：

|            |      |      |      |
|------------|------|------|------|
| $x$        | 0    | 1    | 2    |
| $P(X = x)$ | 0.90 | 0.08 | 0.02 |

則兩週內發生故障之次數的機率分配為何？

3. 人類從受孕到分娩的懷孕期，長短各有不同，但大致遵循平均數 266 天，標準差 16 天常態分布。用 68-95-99.7 規則回答下列問題。

- (a) 中間 95% 的懷孕期會落在哪兩個數字之間？  
(b) 懷孕期最短的 2.5% 會有多短？

4. 對大一學生所作之身高體重的抽樣調查，計算 BMI (Body Mass Index)：體重(公斤) 其身高(公尺) 的平方，經檢查所得的男生與女生的 BMI 數據並未發現有違反常態假設情況，數據整理如下：

| 性別 | 人數 | 平均數   | 標準差  |
|----|----|-------|------|
| 男生 | 27 | 21.38 | 3.01 |
| 女生 | 21 | 19.93 | 3.22 |

- (a) 以 0.05 的顯著水準判斷男生的平均 BMI 是否大於女生的平均 BMI？  
(b) 計算男生的平均 BMI 與女生的平均 BMI 差量的 95% 信賴區間。

5. 求數據  $(x_i, y_i)$ :  $(-3, 0)$ ,  $(-1, 1)$ ,  $(0, 2)$  和  $(2, 3)$  的最小平方迴歸直線： $y = \hat{\beta}_0 + \hat{\beta}_1 x$



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$T_{df}$  分佈臨界值  $t_{df,p} : P T_{df} \geq t_{df,p} = p$

| $df \backslash p$ | 0.2500 | 0.2000 | 0.1500 | 0.1000 | 0.0500 | 0.0250 | 0.0200 | 0.0100 | 0.0050 | 0.0025  | 0.0010  | 0.0005  | $p \backslash df$ |
|-------------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|---------|---------|---------|-------------------|
| 1                 | 1.000  | 1.376  | 1.963  | 3.078  | 6.314  | 12.710 | 15.890 | 31.820 | 63.660 | 127.300 | 318.300 | 636.600 | 1                 |
| 2                 | 0.816  | 1.061  | 1.386  | 1.886  | 2.920  | 4.303  | 4.849  | 6.965  | 9.925  | 14.090  | 22.330  | 31.600  | 2                 |
| 3                 | 0.765  | 0.978  | 1.250  | 1.638  | 2.353  | 3.182  | 3.482  | 4.541  | 5.841  | 7.453   | 10.210  | 12.920  | 3                 |
| 4                 | 0.741  | 0.941  | 1.190  | 1.533  | 2.132  | 2.776  | 2.999  | 3.747  | 4.604  | 5.598   | 7.173   | 8.610   | 4                 |
| 5                 | 0.727  | 0.920  | 1.156  | 1.476  | 2.015  | 2.571  | 2.757  | 3.365  | 4.032  | 4.773   | 5.893   | 6.869   | 5                 |
| 6                 | 0.718  | 0.906  | 1.134  | 1.440  | 1.943  | 2.447  | 2.612  | 3.143  | 3.707  | 4.317   | 5.208   | 5.959   | 6                 |
| 7                 | 0.711  | 0.896  | 1.119  | 1.415  | 1.895  | 2.365  | 2.517  | 2.998  | 3.499  | 4.029   | 4.785   | 5.408   | 7                 |
| 8                 | 0.706  | 0.889  | 1.108  | 1.397  | 1.860  | 2.306  | 2.449  | 2.896  | 3.355  | 3.833   | 4.501   | 5.041   | 8                 |
| 9                 | 0.703  | 0.883  | 1.100  | 1.383  | 1.833  | 2.262  | 2.398  | 2.821  | 3.250  | 3.690   | 4.297   | 4.781   | 9                 |
| 10                | 0.700  | 0.879  | 1.093  | 1.372  | 1.812  | 2.228  | 2.359  | 2.764  | 3.169  | 3.581   | 4.144   | 4.587   | 10                |
| 11                | 0.697  | 0.876  | 1.088  | 1.363  | 1.796  | 2.201  | 2.328  | 2.718  | 3.106  | 3.497   | 4.025   | 4.437   | 11                |
| 12                | 0.695  | 0.873  | 1.083  | 1.356  | 1.782  | 2.179  | 2.303  | 2.681  | 3.055  | 3.428   | 3.930   | 4.318   | 12                |
| 13                | 0.694  | 0.870  | 1.079  | 1.350  | 1.771  | 2.160  | 2.282  | 2.650  | 3.012  | 3.372   | 3.852   | 4.221   | 13                |
| 14                | 0.692  | 0.868  | 1.076  | 1.345  | 1.761  | 2.145  | 2.264  | 2.624  | 2.977  | 3.326   | 3.787   | 4.140   | 14                |
| 15                | 0.691  | 0.866  | 1.074  | 1.341  | 1.753  | 2.131  | 2.249  | 2.602  | 2.947  | 3.286   | 3.733   | 4.073   | 15                |
| 16                | 0.690  | 0.865  | 1.071  | 1.337  | 1.746  | 2.120  | 2.235  | 2.583  | 2.921  | 3.252   | 3.686   | 4.015   | 16                |
| 17                | 0.689  | 0.863  | 1.069  | 1.333  | 1.740  | 2.110  | 2.224  | 2.567  | 2.898  | 3.222   | 3.646   | 3.965   | 17                |
| 18                | 0.688  | 0.862  | 1.067  | 1.330  | 1.734  | 2.101  | 2.214  | 2.552  | 2.878  | 3.197   | 3.610   | 3.922   | 18                |
| 19                | 0.688  | 0.861  | 1.066  | 1.328  | 1.729  | 2.093  | 2.205  | 2.539  | 2.861  | 3.174   | 3.579   | 3.883   | 19                |
| 20                | 0.687  | 0.860  | 1.064  | 1.325  | 1.725  | 2.086  | 2.197  | 2.528  | 2.845  | 3.153   | 3.552   | 3.850   | 20                |
| 21                | 0.686  | 0.859  | 1.063  | 1.323  | 1.721  | 2.080  | 2.189  | 2.518  | 2.831  | 3.135   | 3.527   | 3.819   | 21                |
| 22                | 0.686  | 0.858  | 1.061  | 1.321  | 1.717  | 2.074  | 2.183  | 2.508  | 2.819  | 3.119   | 3.505   | 3.792   | 22                |
| 23                | 0.685  | 0.858  | 1.060  | 1.319  | 1.714  | 2.069  | 2.177  | 2.500  | 2.807  | 3.104   | 3.485   | 3.768   | 23                |
| 24                | 0.685  | 0.857  | 1.059  | 1.318  | 1.711  | 2.064  | 2.172  | 2.492  | 2.797  | 3.091   | 3.467   | 3.745   | 24                |
| 25                | 0.684  | 0.856  | 1.058  | 1.316  | 1.708  | 2.060  | 2.167  | 2.485  | 2.787  | 3.078   | 3.450   | 3.725   | 25                |
| 26                | 0.684  | 0.856  | 1.058  | 1.315  | 1.706  | 2.056  | 2.162  | 2.479  | 2.779  | 3.067   | 3.435   | 3.707   | 26                |
| 27                | 0.684  | 0.855  | 1.057  | 1.314  | 1.703  | 2.052  | 2.158  | 2.473  | 2.771  | 3.057   | 3.421   | 3.690   | 27                |
| 28                | 0.683  | 0.855  | 1.056  | 1.313  | 1.701  | 2.048  | 2.154  | 2.467  | 2.763  | 3.047   | 3.408   | 3.674   | 28                |
| 29                | 0.683  | 0.854  | 1.055  | 1.311  | 1.699  | 2.045  | 2.150  | 2.462  | 2.756  | 3.038   | 3.396   | 3.659   | 29                |
| 30                | 0.683  | 0.854  | 1.055  | 1.310  | 1.697  | 2.042  | 2.147  | 2.457  | 2.750  | 3.030   | 3.385   | 3.646   | 30                |
| 40                | 0.681  | 0.851  | 1.050  | 1.303  | 1.684  | 2.021  | 2.123  | 2.423  | 2.704  | 2.971   | 3.307   | 3.551   | 40                |
| 50                | 0.679  | 0.849  | 1.047  | 1.299  | 1.676  | 2.009  | 2.109  | 2.403  | 2.678  | 2.937   | 3.261   | 3.496   | 50                |
| 60                | 0.679  | 0.848  | 1.045  | 1.296  | 1.671  | 2.000  | 2.099  | 2.390  | 2.660  | 2.915   | 3.232   | 3.460   | 60                |
| 80                | 0.678  | 0.846  | 1.043  | 1.292  | 1.664  | 1.990  | 2.088  | 2.374  | 2.639  | 2.887   | 3.195   | 3.416   | 80                |
| 100               | 0.677  | 0.845  | 1.042  | 1.290  | 1.660  | 1.984  | 2.081  | 2.364  | 2.626  | 2.871   | 3.174   | 3.390   | 100               |

~全卷完~