國立中山大學九十學年度碩博士班招生考試試題

科目：普通生物學【生科系碩士班】

一、單選題：（50%）

1. What is the voltage across cell membranes called?
(A) membrane potential (B) osmotic potential (C) chemical gradient
(D) electrochemical gradient (E) water potential

2. All of the following cellular activities require ATP energy except:
(A) cytoplasmic streaming (B) movement of O_2 into the cell (C) exocytosis
(D) protein synthesis (E) Na+ ions moving out of the cell

3. The glycoproteins and glycolipids of animal cell membranes are most important for:
(A) facilitated diffusion of molecules down their concentration gradients
(B) active transport of molecules against their concentration gradients
(C) maintaining membrane fluidity at low temperatures
(D) maintaining the integrity of a fluid-mosaic membrane
(E) the ability of cells to recognize like and different cells

4. How do the daughter cells at the end of mitosis and cytokinesis compare with their parent cell when it was in G1 of the cell cycle?
(A) The daughter cells have the same number of chromosomes and half the amount of DNA.
(B) The daughter cells have the same number of chromosomes and twice the amount of DNA.
(C) The daughter cells have half the number of chromosomes and half the amount of DNA.
(D) The daughter cells have the same number of chromosomes and the same amount of DNA.
(E) The daughter cells have half the amount of cytoplasm and half the amount of DNA.

5. Cells that have stopped dividing and are differentiating are
(A) in the G2 phase of the cell cycle (B) cancer cells
(C) in the G1 phase of the cell cycle (D) in the S phase of the cell cycle
(E) in the M phase of the cell cycle

6. Muscle cells are stimulated by neurotransmitters released from the tips of
(A) motor cell dendrites (B) motor cell axons (C) T tubules
(D) sensory cell dendrites (E) sensory cell axons

7. What is the primer that is required to initiate the synthesis of a new DNA strand?
(A) DNA (B) protein (C) RNA
(D) primase (E) ligase

8. All of the following are transcribed from DNA except
(A) protein (B) tRNA (C) exons
(D) mRNA (E) rRNA

9. Which of the following represents a difference between viruses and viroids?
(A) Viruses contain introns; viroids have only exons.
(B) Viruses have genomes composed of DNA; while viroids have genomes composed of RNA.
(C) Viruses cannot pass through plasmodesmata; viroids can.
(D) Viruses infect many types of cells, while viroids infect only prokaryotic cells.
(E) Viruses have capsids composed of protein, while viroids have no capsids.

10. Which extraembryonic membrane of a chick embryo is a receptacle for uric acid wastes?
(A) chorion (B) allantois (C) trophoblast
(D) yolk sac (E) amnion

11. What is the genetic function of restriction endonuclease?
(A) joins nucleotides during replication
(B) adds new nucleotides to the growing strand of DNA
(C) joins nucleotides during transcription
(D) cleaves nucleic acids at specific sites
(E) repairs breaks in sugar-phosphate backbones

12. A cell that remains flexible in its developmental possibilities is said to be
(A) epigenic (B) determined (C) totipotent
(D) genomically equivalent (E) differentiated

13. What are bacteria that are poisoned by oxygen called?
(A) obligate anaerobes (B) aerobes (C) facultative anaerobes
(D) cyanobacteria (E) aestivating bacteria

14. Which feature of protists is probably endosymbiotic in origin?
(A) acritarchs (B) microtubules (C) cysts
(D) mitochondria (E) a nucleus

15. Which of the following characteristics correctly applies to protosome development?
(A) blastopore becomes the anus (B) radial cleavage (C) determinate cleavage
(D) enterocoelous (E) archenteron absent

16. An arthropod has all the following characteristics expect
(A) three embryonic germ layers (B) bilateral symmetry (C) protostome development
(D) pseudocoelom (E) true tissues

17. In which class did jaws first occur?
(A) Placodermi (B) Agnatha (C) Ostracodermi
(D) Chondrichthyes (E) Osteichthyes

18. Which of the following is the era known as the "age of reptiles"?
(A) Cambrian (B) Cenozoic (C) Paleozoic
(D) Mesozoic (E) Precambrian

19. Pregnancy tests are based on the detection of which of the following hormones?
(A) GnRH (B) HCG (C) FSH
(D) progesterone (E) estrogen

20. Cartilage is described as which of the following types of tissue?
(A) adipose (B) epithelial (C) reproductive
(D) nervous (E) connective

21. Which of the following is a correct statement about pepsin?
(A) It is activated by the action of HCl on pepsinogen.
(B) It is manufactured by the pancreas.
(C) It helps stabilize fat-water emulsions.
(D) It splits maltose into monosaccharides.
(E) It is denatured and rendered inactive in solutions with low pH.

22. A structure that produces no digestive secretions of any kind is the
(A) liver (B) pancreas (C) duodenum
(D) gallbladder (E) salivary gland

23. If a molecule of CO_2 released into the blood in your left toe travels out of your nose, it must pass through all of the following structures expect the
(A) right ventricle (B) trachea (C) alveolus
(D) right atrium (E) pulmonary vein

24. Tracheal systems for gas exchange are found in
(A) earthworms (B) vertebrates (C) insects
(D) jellyfish (E) crustaceans

25. Urea is produced in the
(A) kidneys from glucose (B) liver from NH_3 and CO_2 (C) liver from glycogen
(D) bladder from uric acid and H_2O (E) kidneys from glycerol and fatty acids

26. Which of the following levels in the hierarchy of biological organization includes all of the other levels in the list?
(A) population (B) ecosystem (C) community
(D) organism (E) organ system

27. A table listing such items as age, observed number of organisms alive each year, and life expectancy is known as a(an)
(A) life table. (B) survivorship table. (C) rate table.
(D) mortality table. (E) insurance table.

The following three questions (questions 28-30) will use the answers below. Each answer may be used once, more than once, or not at all.

(A) Antonie van Leeuwenhoek (B) Robert Hooke (C) Charles Darwin
(D) Barbara McClintock (E) Matthias Schleiden and Theodor Schwann

28. Discovered single-celled organisms.
29. Used observation of inheritance in corn to describe what turned out to be a novel molecular mechanism.
30. Concluded that all living things consist of cells.
31. Which of these is an example of a negative feedback system?
(A) The transfer of the universal genetic code that is shared by all organisms.
(B) Mammals are able to reduce the amount of glucose in their blood following a meal by increased pancreatic secretion of insulin.
(C) Plants use light energy to convert water and carbon dioxide to sugar and oxygen.
(D) A bird's unique structure makes flight possible.
(E) Enzymes increase the rate of chemical reactions.
32. ingdoms are frequently grouped into a higher category known as
(A) ukarya (B) phyla (C) domains
(D) archaea (E) epochs.
33. Gene flow is a concept best used to describe an exchange between
(A) populations. (B) males and females. (C) species.
(D) chromosomes. (E) individuals.
34. The changing facial features of a maturing child are an example of
(A) paedogenesis. (B) preadaptation. (C) allometric growth.
(D) phylogeny. (E) homologies.
35. The half-life of carbon 14 is 5,600 years. A fossil that has one-eighth the normal proportion of carbon 14 to carbon 12 is probably
(A) 22,400 years old. (B) 2,800 years old. (C) 16,800 years old.
(D) 11,200 years old. (E) 1,400 years old.
36. Which of the following is believed to be the most likely cause of the Cretaceous extinctions?
(A) adaptive radiation (B) the eruption of Mount Pinatubo (C) continental drift
(D) the collapse of food chains (E) the impact of an asteroid or a comet
37. Evidence from DNA-DNA hybridization puts the giant panda with the bears, but places the panda in the racoon family. The similarity of body morphology of these two animals must therefore be due to
(A) possession of shared primitive characters. (B) inheritance of synapomorphies.
(C) inheritance of acquired characteristics. (D) sexual selection.
(E) convergent evolution.
38. Probably the most important factors affecting the distribution of biomes are
(A) climate and topography. (B) wind and water current patterns.
(C) day length and rainfall. (D) species diversity and abundance.
(E) community succession and climate.
39. In which community would organisms most likely have evolved to respond to different photoperiods?
(A) savanna (B) coral reef (C) tropical forest
(D) abyssal (E) temperate forest
40. Learning to ignore unimportant stimuli is called
(A) spacing. (B) conditioning. (C) habituation.
(D) imprinting. (E) adapting.
41. The type of learning that causes specially trained dogs to salivate when they hear bells is called
(A) classical conditioning. (B) imprinting. (C) habituation.
(D) insight. (E) trial-and-error learning.
42. The most common kind of dispersion in nature is
(A) dispersive. (B) random. (C) indeterminate.
(D) uniform. (E) clumped.

43. Which of the following observations and ideas are incorporated into Darwin's concept of natural selection?
(A) Reproductive potential equals what the environment can support.
(B) A change in the environment will create an appropriate, heritable adaptation during the lifetime of individuals coping with that environment.
(C) Members of a population in a particular environment are equal in their potential for leaving offspring.
(D) Through natural selection, a population may adapt to the environment over many generations.
(E) Individuals of a population do not vary.

44. Carrying capacity (K)
(A) is often determined by energy limitation.
(B) differs among species, but does not vary within a given species.
(C) is calculated as the product of annual per capita birth rate (r).
(D) remains constant in the presence of density-dependent population regulation.
(E) none of above

45. Which of the following could cause a realized niche to differ from a fundamental niche?
(A) water availability (B) suitable habitat (C) temperature limitations
(D) competition from other species (E) food size and availability

46. Which of the following types of species interaction is INCORRECTLY paired to its effects on the density of the two interacting populations?
(A) mutualism--both increase (B) predation--one increases, one decreases
(C) commensalism--both increase (D) parasitism--one increases, one decreases
(E) competition--both decrease

47. A cow's diet indicates that it is primarily a
(A) secondary consumer. (B) producer. (C) primary consumer.
(D) decomposer. (E) autotroph.

48. In the nitrogen cycle, the bacteria that replenish the atmosphere with N2 are
(A) Rhizobium bacteria. (B) nitrifying bacteria. (C) denitrifying bacteria.
(D) nitrogen-fixing bacteria. (E) methanogenic protozoans.

49. Relatively small geographic areas with high concentrations of endemic species are known as
(A) critical communities. (B) endemic metapopulations. (C) endemic sinks.
(D) biodiversity hot spots. (E) all of above

50. Which of the following is a method of predicting the likelihood that a species will persist in a particular environment?
(A) source-sink analysis. (B) None of the above can predict whether a species will persist.
(C) minimum viable population size. (D) population of dynamic analysis.
(E) population viability analysis.

二、問答題：（50%）

1. Describe the characteristics that you can distinguish reptiles form amphibians? (8%)
2. Discuss allergies, tissue rejection, and autoimmune diseases as they relate to the immune system. (9%)
3. Explain the following terms: (8%)
(A) Karyotype
(B) Trochophore
(C) Proglottids
(D) Circadian rhythm
4. Name the divisions (phylums) of gymnosperm and describe their characteristics. (15%)
5. More than twenty species concepts were proposed, name any three of them and compare those three. (10 %).

國立中山大學九十學年度碩博士班招生考試試題

科目：生物化學【生科系碩士班】甲.乙組

1. Most macromolecules found in cells can be classified into four categories: lipids, carbohydrates, proteins, and nucleic acids. Give one example for each category and describe the structural and chemical properties that suit it for the functions it serves in cells. (10 %)

2. Describe three types of non-covalent interactions that are critical in maintaining the three-dimensional structures of proteins and nucleic acids. (10 %)

3. Two polypeptides, X and Y, have similar tertiary structure but X normally exists as a monomer, whereas Y exists as a tetramer. (10 %)
   (1) What differences might be expected in the amino acid composition or sequence of X versus Y?
   (2) What might be the structural and functional advantages of subunit Y to associate in tetrameric structure?

4. Discuss the biochemical basis of the following: (10 %)
   (1) The use of allopurinol to treat gout.
   (2) The use of methotrexate to disrupt DNA synthesis.
   (3) The use of low-phenylalanine diet to treat phenylketonuria (PKU).
   (4) The use of Mevinolin to lower serum cholesterol levels.
   (5) The use of Aspirin as non-steroidal anti-inflammatory drug.

5. Describe any three strategies that are used to regulate cellular metabolism. (10 %)

6. Describe the steps of glycolysis and Kreb cycle. (10 %)

7. Describe how ATP is synthesized in mitochondria. (10 %)

8. Describe the C-4 pathway in C-4 plants. (10 %)

9. Terms explanations: (20 %)
   (1) Competitive inhibition
   (2) Allosteric regulation
   (3) Ribozyme
   (4) Induced fit hypothesis for enzyme action
   (5) Catalytic triad of active site

I. Select the best answer for each of the following questions: (30%)

1. All of the following steps occurred in the Holliday model for genetic recombination except
   a. introduction of nicks into both strands of homologous DNA molecules
   b. base pairing of nicked strands with the complementary sequence of the homologous DNA molecules
   c. branch migration of the cross-strand structure
   d. breaking and rejoining of DNA molecules
2. Which of the following is not a true statement about the *E. coli* chromosome?
   a. The *E. coli* chromosome contains one replication origin.
   b. The *E. coli* chromosome is supercoiled.
   c. The *E. coli* chromosome is about 1 centimeter long.
   d. The *E. coli* chromosome is circular.
3. Proteins that are encoded in the mouse genome but not encoded by the Archaea are those involved in
   a. intermediary metabolism
   b. DNA replication
   c. activation (charging) of tRNAs
   d. cell-to-cell signaling
4. Translation is an important process for gene expression that involves many molecules. Which of the following is not involved in translation?
   a. initiation factors
   b. topoisomerase
   c. aminoacyl-tRNA synthetase
   d. ribosomal RNA
5. Which of the following mechanism leads to the blocking of transcription initiation in negative control of the *lac* operon?
   a. *lac* repressor binding induces a protease which degrades the sigma factor of RNA polymerase
   b. *lac* repressor binding causes a conformational change in RNA polymerase
   c. *lac* repressor binding induces a DNase which cleaves the DNA at the transcription start site
   d. *lac* repressor binding blocks RNA polymerase from interacting with DNA at the start site

6. Repair of DNA in eukaryotes is less important than in prokaryotes because of the diploid character of somatic cells. So far, retrieval systems (post-replication repair), excision repair and recombination repair systems have been identified. DNA damage in transcriptionally active genes is preferentially repaired.
   (a) true (b) false
7. A transesterification reaction that occurs in nuclear splicing:
   a. breaks one bond and forms one bond
   b. involves the nucleophilic attack of an OH group on the sugar phosphate backbone
   c. requires no ATP
   d. all of the above
8. Which is not the role of transposase in nonreplicative transposition?
   a. to generate a staggered cut at the target site
   b. to cut out the transposon
   c. to move the transposon physically to its new site
   d. to connect the transposon to the staggered nicks at the target site
9. Which of the following is not true regarding the statement of eukaryotic genes are often interrupted?
   a. It refers to the separation of coding units, the 'exons', by noncoding 'introns'.
   b. It refers to the fact that eukaryotic DNA is linear and separated in individual chromosomes. Therefore genes may be partly on one chromosome and partly on another.
   c. It means that the primary transcript must be processed in order to be translatable.
   d. It means that eukaryotic genes may have multiple expression products because it is possible to use different combination of exons to construct the mRNA.
10. Transcription initiation of prokaryotes depends on formation of a RNA polymerase holoenzyme. Binding of a given sigma factor determined by the
    a. recognition of the length and spacing of promoter consensus sequences.
    b. interaction with core enzyme.
    c. length of the transcription unit.
    d. distance of the translational start codon.

II. Answer the following questions:

1. Define the following terms: (15%)

(a) trans-acting　　(b) initiator　　(c) electroporation

(d) alternative splicing　　(e) internal ribosome entry sequence (IRES)

2. Describe the characteristics and functions of RNA molecules of eukaryotes. (15%)

3. It has been reported that the number of total human genes is 80,000-100,000. However, two papers that published in this year's Nature Genetics claimed that total human genes are between 30,000 and 34,000. If the latter findings were true, what implications would show regarding expression of human genes? (15%)

4. Describe the positive and negative controls of *lac* operon. (15%)

5. A student has been working on isolation of a plasmid from one bacterial clone. She checked the isolated plasmid by agarose gel electrophoresis. Instead of a single band of the plasmid appeared, several bands were shown on the gel after ethidium bromide staining. Explain the possible reason(s). (10%)

國立中山大學九十學年度碩博士班招生考試試題

科目：動物生理學【生科系碩士班】甲組選考

1. 試述經由小腸上皮細胞吸收營養物 glucose 之主要過程。若經由循環系統供應 ATP，ouabain，則上皮細胞對 glucose 傳送的作用將產生何種變異？請解說之。(10%)

2. 請敘述 Renin-angiotensin-aldosterone system 之內容。當大量失血時，此系統如何產生反應？(10%)

3. 當血流穩定而平緩時 (laminar flow)，吾人血管中血流量可以依據 Poiseulle's law 來估算。試依據此定律描述影響動脈血流量之因素，並說明造成主動脈血流與小動脈血流流速差異之主要理由。(10%)

4. 解釋下列名詞 (30%)
   ① Active transport (3%)
   ② G-protein (3%)
   ③carotid body (3%)
   ④metabolic acidosis (3%)
   ⑤ADH (antidiuretic hormone) (3%)
   ⑥surfactant (3%)
   ⑦alveolar ventilation (3%)
   ⑧ Synapse (3%)
   ⑨residual volume of the lung (3%)
   ⑩EKG (electrocardiogram) (3%)

5、動物體主要以下列三種方式來調節體內的酸鹼平衡：一是靠體液中的的化學酸鹼緩衝液(chemical acid-base buffer)，另外則是靠呼吸系統及腎臟系統來調節。體液中的緩衝系統可分為三大類，請詳述其組成及作用方式 (12%)。

6、試述蛋白質在動物體內的消化過程(8%)

7、為何骨骼肌又稱為橫紋肌？ (3%)
   請描述骨骼肌 excitation-contraction coupling 的過程(9%)

8、試述神經動作電位誘發及傳導的機制(8%)

國立中山大學九十學年度碩博士班招生考試試題

科目：免疫學【生科系碩士班】甲組選考

一、**選擇題：** (20%)

1. Which of the following statements about humoral immunity is correct?
   (A) It is responsible for transplant tissue rejection
   (B) It protects the body against cells that become cancerous
   (C) It primarily defends against fungi and protozoa
   (D) It is mounted by lymphocytes that have matured in the bone marrow
   (E) It primarily defends against bacteria and viruses that have already infected cells

2. A transfusion of type A blood given to a person who has type O blood would result in:
   (A) no reaction because type O is a universal donor
   (B) no reaction because the O-type individual does not have antibodies
   (C) the recipient's antibodies reacting with the RBC from a heterozygote (I^Ai) donor
   (D) the recipient's anti-A antibodies clumping the donated RBC
   (E) the recipient's RBC reacting with the donated anti-B antibodies

3. The following events occur when a mammalian immune system first encounters a pathogen. Place them in correct sequence, and then choose the answer that indicates that sequence. [I. Pathogen is destroyed; II. Lymphocytes secrete antibodies; III. Antigenic determinants from pathogen bind to antigen receptors on lymphocytes; IV. Lymphocytes specific to antigenic determinants from pathogen become numerous; V. Only memory cells remain]
   (A) IV, II, III, I, V; (B) I, III, II, IV, V; (C) II, I, IV, III, V
   (D) III, IV, II, I, V; (E) III, II, I, V, IV

4. A patient reports severe symptoms of watery, itchy eyes and sneezing after being given a flower bouquet as a birthday gift. A reasonable initial treatment would involve the use of:
   (A) complements (B) antihistamines (C) monoclonal antibodies
   (D) a vaccine (E) interferon-γ

5. Naturally acquired passive immunity would involve the:
   (A) placental transfer of antibodies (B) injection of antibodies
   (C) ingestion of interferon (D) injection of vaccines
   (E) absorption of pathogens through mucous membranes

6. Which of the following is not a part of an antibody molecule?
   (A) the epitopes (B) the J chains (C) the light chains
   (D) the secretary components (E) the antigen-binding sites

7. Which of the following is not involved in the activation and functioning of cytotoxic T cells?
   (A) interleukins (B) perforin (C) T cell surface protein CD4
   (D) antigen-presenting cells (E) class I MHC molecules

8. A major difference between active and passive immunity is that active immunity requires
(A) transfer of antibodies from the mother across the placenta
(B) acquisition and activation of antibodies
(C) direct exposure to a living or simulated disease organism
(D) proliferation of lymphocytes in bone marrow
(E) secretion of interleukins from macrophages

9. Which of the following is not involved in both humoral and cell-mediated immunities?
(A) pathogenic cells (B) plasma cells (C) helper T cells
(D) memory cells (E) macrophages

10. Which substances are used in the immune system to kill targeted, infected cells?
[1. antibodies 2. interferon, 3. interleukin-2, 4. complements, 5. perforin]
(A) 1 and 2 (B) 1 and 4 (C) 1, 3 and 4
(D) 4 and 5 (E) 1, 4 and 5

11. There is usually no concern if the mother's blood type is different from that of the developing fetus unless the Rh factor is involved. This is because:
(A) fetal blood cells can cross the placenta
(B) maternal Rh antibodies cannot cross placenta, while those against the ABO blood groups can
(C) maternal Rh antibodies can cross placenta, while those against the ABO blood groups cannot
(D) antibodies against the Rh factor have a much greater impact on antigens
(E) maternal blood cells can cross the placenta

12. Which of the following is not considered as disorder of the immune system?
(A) lupus erythematosus (B) allergic anaphylaxis (C) SCID
(D) AIDS (E) transplant rejection

13. A person with AIDS would be unlikely to suffer from which of the following diseases?
(A) influenza (B) cancer (C) tuberculosis
(D) pneumocystis (E) rheumatoid arthritis

14. A doctor discovers that his patient can produce antibodies against some bacterial pathogens, but unable to protect himself against viral infections. The doctor suspects a disorder in his patient's
(A) B cells (B) cytotoxic cells (C) T cells
(D) plasma cells (E) macrophages

15. Process in which an attenuated pathogen is used to stimulate the body to produce antibodies against the pathogen is called:
(A) clonal selection (B) opsonization (C) complement system
(D) passive immunity (E) vaccination

16. In the inflammatory response, the absence of which of the following would prevent all the others from happening?

(A) release of histamine
(B) leakage of plasma to the affected area
(C) dilation of arterioles
(D) increased permeability of blood vessels
(E) increased population of phagocytes

17. What attracts helper T cells to macrophages?

(A) antibodies
(B) antigens
(C) lymphotoxins
(D) interferons
(E) interleukins

18. Which substance cannot stimulate the proliferation of T cells?

(A) antigen
(B) Con A
(C) lipopolysacchride
(D) interleukin-2
(E) phytohemagglutinin

19. Each of the items below is a response of helper T cells once stimulated except

(A) releasing interleukin-1
(B) enlarging in size
(C) releasing interleukin-2
(D) dividing by mitosis
(E) producing memory cells

20. The function of CD4 and CD8 is to assist T cells in

(A) activating B cells and other T cells
(B) binding of the MHC-antigen complex
(C) recognition of self cells
(D) enhancing secretion of cytokines
(E) secretion of antibodies

二、問答題：

1. Discuss allelic exclusion model in immunoglobulin gene rearrangement in detail. (20 %)

2. A student has isolated protein X from human, which he believes is a new isotype of immunoglobulin. (1) What structural features would protein X have to have in order to be classified as an immunoglobulin? (2) You prepare rabbit antisera to whole human IgG, human κ chain, and human γ chain. Assuming protein X is indeed a new immunoglobulin isotype, to which of these antisera would it bind? Why? (3) Devise an experimental procedure for preparing an antiserum that is specific for protein X. (20 %)

3. Considerable evidence indicates the existence of two T_H-cell subsets, differing in the pattern of cytokines they secrete. (1) What type of immune response is mediated by the T_H1 subset? What type of antigen challenge is likely to induce a T_H1-medicated response? (2) What type of immune response is mediated by the T_H2 subset? What type of antigen challenge is likely to induce a T_H2-medicated response? (3) Show the regulation of T_H subsets by cytokines with a figure. (20 %)

4. Explain the following terms: (1) Clonal deletion, (2) Immunotoxin, (3) DiGeorge's syndrome, (4) Membrane-attack complex, (5) Xenograft. (20 %)

國立中山大學九十學年度碩博士班招生考試試題

科目：微生物學【生科系碩士班】乙組選考

1. Give the complete full name for the following abbreviation terms (2 points each):
   (a) DNA; (b) ATP; (c) PCR; (d) AIDS; (e) HIV; (f) *E. coli*; (g) ELISA; (h) CFU

2. Matching (2 points each):

_____(a) Malaria	1) *Streptococcus pyrogenes*
_____(b) Whooping cough	2) *Bacillus subtilis*
_____(c) Scarlet fever	3) *Bordetella pertussis*
_____(d) Syphilis	4) *Clostridium tetani*
_____(e) Tetanus	5) *Treponema pallidium*
_____(f) Plaque (Black death)	6) *Neisseria gonorrhoeae*
_____(g) Anthrax	7) *Bacillus anthracis*
	8) *Plasmodium malariae*
	9) *Mycobacterium tuberculosis*
	10) *Yersinia pestis*

3. A student is performing the Gram stain technique in the laboratory. In reaching for the alcohol bottle, he mistakenly takes the water bottle and proceeds with the technique. What will be the colors of Gram-positive and Gram-negative bacteria at the conclusion of this process? Give your explanation. (10 points)

4. You are doing the acid-fast stain of a bacterial strain and observed it under a compound microscope by using oil immersion technique. From the following items, select out the articles that you need for this process. (a) slide; (b) transferring loop; (c) cover glass; (d) carbofuchsin; (e) crystal violet; (f) acid-alcohol; (g) methylene blue; (h) safranin; (i) iodine tincture; (j) spectrophotometer; (k) immersion oil; (l) a dissection microscope; (m) a light microscope; (n) a transmission electron microscope; (o) autoclave; (p) Bunsen burner; (q) Petri dish; (r) UV light; (s) pH meter; (t) Durham tube. (8 points)

5. A student of general biology observes a microbiology student using immersion oil and asks why the oil is used. "To increase the magnification of the microscope" is the reply. Do you agree with it or not? Give you explanation. (5 points)

6. A bacterium is described as a peritrichous, facultative anaerobic, heterotrophic, thermophilic streptococcus. Please translate this complex bacteriological language into a description of this bacterium (as detail as possible). (10 points)

7. A microbiologist isolated a mutant bacterial strain that can not perform glycolysis. Would this mean that the Kerb cycle would also stop in this organism? Why? (7 points)

8. What is the cause of mad cow disease? Describe the pathogenic agent in detail. (10 points)

9. (a) What is the difference between "yogurt made with pasteurized milk" and "pasteurized yogurt"? (b) What do "pasteurized" mean? (c) Which yogurt would you choose? Why? (10 points)

10. What is the basic structure of a virus? What is the difference between plus-strand and minus-strand RNA? (10 points)

國立中山大學九十學年度碩博士班招生考試試題

科目：植物生理學【生科系碩士班】乙組選考

1. Explain how water can be moved to the top of a 100 m tree, but a mechanical pump can lift water no higher than about 10.3 m. What prevents the water column in a tree from breakage? Under what conditions might the water column break, and, if it does break, how is it reestablished? (10%)

2. What is meant by critical toxicity level of nutrients? Which elements are most likely to be both essential and toxic to plants? (10%)

3. Which hormones influence flowering and in what ways? (10%)

4. What is LHCII and why is there more in the thylakoids of shade-grown leaves than in sun-grown leaves? How does LHCII work? (10%)

5. In what ways does temperature influence physiological processes? Does temperature interact with other environmental factors? If so, which ones? (10%)

6. Describe the possible steps in the action of auxin. 10%
7. Describe how plants response to environmental stress. 10%
8. Describe the mechanism of gibberellin action. 10%
9. Describe how phytochrome regulates the expression of the light-regulated genes. 10%
10. Describe the model for the redistribution of calcium and auxin during gravitropism. 10%

國立中山大學九十學年度碩博士班招生考試試題

科目：生態學【生科系碩士班】丙組選考

I. 解釋名詞：每一子題 4 分（共 32 分, 32%）

1. edge effect
2. habitat
3. primary productivity
4. community
5. secondary succession
6. assimilation efficiency
7. biome
8. importance value

II. 問答題（38%）

9. 試將 producers, herbivores, carnivores, decomposers, energy 及 carbon element 以箭頭表示在一 ecosystem 中相互間之關係。（10%）
10. 若一地區的 trophic levels 有 5 層，最下一層之 energy 產量為每年有 10^{10} kcal，試大致估算可供最上一層 trophic level 能獲得之能量有多少？也大致估算該最上一層實際能吸收利用之能量有多少？（8%）
11. 定義且區分 predation 的各種形式. 解釋 the interaction between predators and preys. （10%）
12. What are density-dependent mechanisms that involve population regulation. （10%）

Ⅲ. 解釋並區分下列各組名詞：每一子題 10 分（共 30 分, 30%）

13. exponential growth and logistic growth
14. life table and life history
15. carrying capacity and sustained yield

國立中山大學九十學年度碩博士班招生考試試題

科目：植物分類學【生科系碩士班】丙組選考

一、單選題（50分）

1. 一木本植物。具有芳香味的單葉。花被6片排成2輪；雄蕊12，每3枚一輪，排成4輪，花藥瓣裂。這種植物屬（1）木蘭科（2）木犀科（3）冬青科（4）樟科。
2. 一種草本植物。花兩性，放射對稱；雄蕊6枚，其中4枚長，2枚短。果實為角果。這種植物屬（1）酢漿草科（2）十字花科（3）菊科（4）旋花科。
3. 一種草質藤本植物，有捲鬚。花單性；萼5片；花瓣5片合生，黃色，雄蕊5成扭曲狀；子房下位。果大，多汁。這種植物屬（1）瓜科（2）西番蓮科（3）葡萄科（4）旋花科。
4. 一種木本植物。葉呈針狀，簇生在莖的短枝上。種子外面沒有果皮，而是長在鱗片上表面。這種植物屬（1）木麻黃科（2）松科（3）仙人掌科（4）木賊科。
5. 一種木本植物，有白色乳汁。單葉，輪生。花瓣裂片5，常在花苞時扭轉排列，合生成漏斗形。瘦突果成對而生，內有被白毛的種子。這種植物屬（1）桑科（2）大戟科（3）海桐科（4）夾竹桃科。
6. 一種木本植物。有複葉。花小，多朵集生成頭狀花序，放射對稱。果實為莢果。這種植物為（1）菊科（2）茜草科（3）含羞草科（4）蘇木科。
7. 一種木本植物。有羽狀複葉。心皮螺旋著生在莖頂，胚珠裸露在心皮柄兩側。這種植物為（1）木蘭科（2）蘇鐵科（3）杉科（4）八角科。
8. 一種植物。單葉，對生，有托葉。花兩性，合瓣花；子房下位。這種植物屬（1）茜草科（2）桑科（3）冬青科（4）灰木科。
9. 一種草本植物。單葉，羽狀脈。花通常小，多朵集生在一膨大扁花托上，成頭狀花序，有舌狀和筒狀花之分。果實為瘦果。這種植物屬（1）茜草科（2）百合科（3）龍舌蘭科（4）菊科。
10. 一種草本植物。莖圓，分節與節間，節間中空。葉線形，平行脈。花瓣退化，被穎和稃包住。這種植物屬（1）莎草科（2）虎耳草科（3）禾本科（4）鴨跖草科。
11. 一種草本植物。葉深裂，有葉鞘。花兩性；萼5片；花瓣5片，黃色；雄蕊與雌蕊都是多數，螺旋排列。這種植物屬（1）八角科（2）毛茛科（3）繖形科（4）櫻草科。
12. 一種草本植物；有地下根莖，無地上莖，葉由根莖長出。葉圓形，直徑長達20 cm以上，邊緣有一深裂至中央的缺刻，下方中央有一長柄。花瓣多數（花萼下表面綠色），具鮮豔色彩。雄蕊多數，心皮多數（合生或半合生），這種植物屬（1）菊科（2）蘭科（3）大花草科（4）睡蓮科。

13. 一種木質藤本植物，有捲鬚。葉掌狀深裂。花小，淡綠色，排成圓錐花序。果為漿果，球形，小。這種植物為（1）葡萄科（2）旋花科（3）西番蓮科（4）菝葜科。
14. 一種草本植物。單葉，對生。花兩性，放射對稱；萼 5 片；花瓣 5 片，前端深 2 裂；雄蕊 10；子房上位，中央獨立胎座。果為蒴果。這種植物為（1）蓼科（2）鳶尾科（3）杜鵑花科（4）石竹科。
15. 一種草質纏繞藤本，具汁液，無捲鬚。單葉，掌狀深裂。萼片 5 片，果成熟時仍存留；花瓣 5，合生成漏斗狀。果為蒴果。這種植物屬（1）旋花科（2）菊科（3）蘿藦科（4）馬鞭草科。
16. 一種木本植物。單葉，互生，有托葉。花兩性，單生；萼片 5，具副（附）萼；花瓣 5，基部合生；花絲連合成筒狀，包住花柱，柱頭 5。果為蒴果。這種植物為（1）木棉科（2）錦葵科（3）福木科（4）桃金孃科。
17. 一種木本植物，有乳汁。單葉，羽狀脈，托葉早落，留下一圈托葉痕。花小，單性，常集生成頭狀而被包於膨大球形中空的花托內。這種植物屬（1）木蘭科（2）大風子科（3）桑科（4）杜英科。
18. 一種草本植物，有地下塊狀根莖。單葉，具平行脈。花 3 數，兩側對稱，大，有唇瓣，具鮮豔顏色；雄蕊 1，夾住花柱，不與花柱合生。這種植物屬（1）蘭科（2）鳶尾科（3）百合科（4）薑科。
19. 一種木本植物，常有刺。單身複葉，具芳香味，葉上滿佈透明油點。花兩性，白色，具芳香味；萼片與花瓣 3-5 片；雄蕊多數，排成 2 輪。果為漿果。這種植物屬（1）報春花科（2）紫金牛科（3）藤黃科（4）芸香科。
20. 一種草本植物。單葉，具平行脈。花單性，集生成穗狀，雄花在花序上方，雌花在下方。花序外有一大而具顏色苞片。這種植物屬（1）百合科（2）棕櫚科（3）天南星科（4）竹芋科。

二、問答題

1、現存的顯花植物中，那一群植物比較原始？有那些證據？請討論之（20 分）。

2、請就你所知的顯花植物分類系統中，任舉二分類系統，敘述其如何分類，並討論此二分類系統間的異同（30 分）。

國立中山大學九十學年度碩博士班招生考試試題

科目：生物統計學【生科系碩士班】丙組選考

1. It is hypothesized that the argali sheep in Xinjing have longer horns than sheep from Tibet. Test this hypothesis (by computing t), using the following horn length data. Assume that the data are from a normal distribution with unknown but equal variances. 25%

Xinjing	Tibet
100	80
90	70
110	75
120	100
90	80
110	95
120	

2. Explain the following terms: 25%
   a. Type I error
   b. the power of a statistical test
   c. paired sampled test
   d. correlation coefficient
   e. non-parametric test

3. In a study of the effects of sex and 4 drugs on the blood calcium concentration of rats, the following ANOVA table is provided. 25%

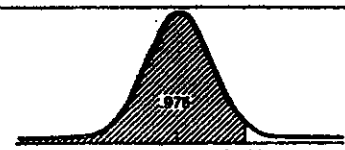
Source of Variation	Sum of Squares	DF	Mean Squares	F
Sex	2,880	1	?	?
Drugs (error)	18,000	?	?	?
Error	3,000	20		
Total	?	?		

a. What is the total variation? total degree of freedom?
b. How many rats were used in the study?
c. What are the values of the F ratio? Are there significant effects of sex or of drugs? Let $\alpha = 0.05$.

4. The following table provides a survey of the people in three cities on whether they would agree to give aborigines' hunting (原住民狩獵) the legal status. Are there differences of sample proportions obtained from the three cities? Let $\alpha = 0.01$. 25%

	Taipei	Taichung	Kaohsiung
Agree	250	80	100
Not Agree	150	70	90

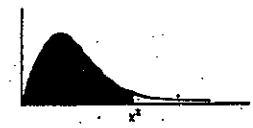
TABLE E Percentiles of the t Distribution



$p(t_{10} \le 2.2281) = .975$

d.f.	$t_{.90}$	$t_{.95}$	$t_{.975}$	$t_{.99}$	$t_{.995}$
1	3.078	6.3138	12.706	31.821	63.657
2	1.886	2.9200	4.3027	6.965	9.9248
3	1.638	2.3534	3.1825	4.541	5.8409
4	1.533	2.1318	2.7764	3.747	4.6041
5	1.476	2.0150	2.5706	3.365	4.0321
6	1.440	1.9432	2.4469	3.143	3.7074
7	1.415	1.8946	2.3646	2.998	3.4995
8	1.397	1.8595	2.3060	2.896	3.3554
9	1.383	1.8331	2.2622	2.821	3.2498
10	1.372	1.8125	2.2281	2.764	3.1693
11	1.363	1.7959	2.2010	2.718	3.1058
12	1.356	1.7823	2.1788	2.681	3.0545
13	1.350	1.7709	2.1604	2.650	3.0123
14	1.345	1.7613	2.1448	2.624	2.9768
15	1.341	1.7530	2.1315	2.602	2.9467
16	1.337	1.7459	2.1199	2.583	2.9208
17	1.333	1.7396	2.1098	2.567	2.8982
18	1.330	1.7341	2.1009	2.552	2.8784
19	1.328	1.7291	2.0930	2.539	2.8609
20	1.325	1.7247	2.0860	2.528	2.8453
21	1.323	1.7207	2.0796	2.518	2.8314
22	1.321	1.7171	2.0739	2.508	2.8188
23	1.319	1.7139	2.0687	2.500	2.8073
24	1.318	1.7109	2.0639	2.492	2.7969
25	1.316	1.7081	2.0595	2.485	2.7874
26	1.315	1.7056	2.0555	2.479	2.7787
27	1.314	1.7033	2.0518	2.473	2.7707
28	1.313	1.7011	2.0484	2.467	2.7633
29	1.311	1.6991	2.0452	2.462	2.7564
30	1.310	1.6973	2.0423	2.457	2.7500
35	1.3062	1.6896	2.0301	2.438	2.7239
40	1.3031	1.6839	2.0211	2.423	2.7045
45	1.3007	1.6794	2.0141	2.412	2.6896
50	1.2987	1.6759	2.0086	2.403	2.6778
60	1.2959	1.6707	2.0003	2.390	2.6603
70	1.2938	1.6669	1.9945	2.381	2.6480
80	1.2922	1.6641	1.9901	2.374	2.6388
90	1.2910	1.6620	1.9867	2.368	2.6316
100	1.2901	1.6602	1.9840	2.364	2.6260
120	1.2887	1.6577	1.9799	2.358	2.6175
140	1.2876	1.6558	1.9771	2.353	2.6114
160	1.2869	1.6545	1.9749	2.350	2.6070
180	1.2863	1.6534	1.9733	2.347	2.6035
200	1.2858	1.6525	1.9719	2.345	2.6006
∞	1.282	1.645	1.96	2.326	2.576

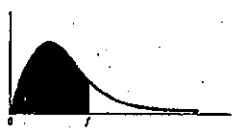
Cumulative chi-squared distribution



$$F(\chi^2) = P[X^2 \le \chi^2]$$

γ \ P	.005	.010	.025	.050	.100	.250	.500	.750	.900	.950	.975	.990	.995
1	.0000393	.000157	.000982	.00393	.0158	.102	.455	1.32	2.71	3.84	5.02	6.63	7.88
2	.0100	.0201	.0506	.103	.211	.575	1.39	2.77	4.61	5.99	7.38	9.21	10.6
3	.0717	.115	.216	.352	.584	1.21	2.37	4.11	6.25	7.81	9.35	11.3	12.8
4	.207	.297	.484	.711	1.06	1.92	3.36	5.39	7.78	9.49	11.1	13.3	14.9
5	.412	.554	.831	1.15	1.61	2.67	4.35	6.63	9.24	11.1	12.8	15.1	16.7
6	.676	.872	1.24	1.64	2.20	3.45	5.35	7.84	10.6	12.6	14.4	16.8	18.5
7	.989	1.24	1.69	2.17	2.83	4.25	6.35	9.04	12.0	14.1	16.0	18.5	20.3
8	1.34	1.65	2.18	2.73	3.49	5.07	7.34	10.2	13.4	15.5	17.5	20.1	22.0
9	1.73	2.09	2.70	3.33	4.17	5.90	8.34	11.4	14.7	16.9	19.0	21.7	23.6
10	2.16	2.56	3.25	3.94	4.87	6.74	9.34	12.5	16.0	18.3	20.5	23.2	25.2
11	2.60	3.05	3.82	4.57	5.58	7.58	10.3	13.7	17.3	19.7	21.9	24.7	26.8
12	3.07	3.57	4.40	5.23	6.30	8.44	11.3	14.8	18.5	21.0	23.3	26.2	28.3
13	3.57	4.11	5.01	5.89	7.04	9.30	12.3	16.0	19.8	22.4	24.7	27.7	29.8
14	4.07	4.66	5.63	6.57	7.79	10.2	13.3	17.1	21.1	23.7	26.1	29.1	31.3
15	4.60	5.23	6.26	7.26	8.55	11.0	14.3	18.2	22.3	25.0	27.5	30.6	32.8
16	5.14	5.81	6.91	7.96	9.31	11.9	15.3	19.4	23.5	26.3	28.8	32.0	34.3
17	5.70	6.41	7.56	8.67	10.1	12.8	16.3	20.5	24.8	27.6	30.2	33.4	35.7
18	6.26	7.01	8.23	9.39	10.9	13.7	17.3	21.6	26.0	28.9	31.5	34.8	37.2
19	6.84	7.63	8.91	10.1	11.7	14.6	18.3	22.7	27.2	30.1	32.9	36.2	38.6
20	7.43	8.26	9.59	10.9	12.4	15.5	19.3	23.8	28.4	31.4	34.2	37.6	40.0
21	8.03	8.90	10.3	11.6	13.2	16.3	20.3	24.9	29.6	32.7	35.5	38.9	41.4
22	8.64	9.54	11.0	12.3	14.0	17.2	21.3	26.0	30.8	33.9	36.8	40.3	42.8
23	9.26	10.2	11.7	13.1	14.8	18.1	22.3	27.1	32.0	35.2	38.1	41.6	44.2
24	9.89	10.9	12.4	13.8	15.7	19.0	23.3	28.2	33.2	36.4	39.4	43.0	45.6
25	10.5	11.5	13.1	14.6	16.5	19.9	24.3	29.3	34.4	37.7	40.6	44.3	46.9
26	11.2	12.2	13.8	15.4	17.3	20.8	25.3	30.4	35.6	38.9	41.9	45.6	48.3
27	11.8	12.9	14.6	16.2	18.1	21.7	26.3	31.5	36.7	40.1	43.2	47.0	49.6
28	12.5	13.6	15.3	16.9	18.9	22.7	27.3	32.6	37.9	41.3	44.5	48.3	51.0
29	13.1	14.3	16.0	17.7	19.8	23.6	28.3	33.7	39.1	42.6	45.7	49.6	52.3
30	13.8	15.0	16.8	18.5	20.6	24.5	29.3	34.8	40.3	43.8	47.0	50.9	53.7

Cumulative F distribution



$$P[F_{\gamma_1,\gamma_2} \le f] = .95$$

γ_2 \ γ_1	1	2	3	4	5	6	7	8	9	10	12	15	20	24	30	40	60	120	∞
1	161.4	199.5	215.7	224.6	230.2	234.0	236.8	238.9	240.5	241.9	243.9	245.9	248.0	249.1	250.1	251.1	252.2	253.3	254.3
2	18.51	19.00	19.16	19.25	19.30	19.33	19.35	19.37	19.38	19.40	19.41	19.43	19.45	19.45	19.46	19.47	19.48	19.49	19.50
3	10.13	9.55	9.28	9.12	9.01	8.94	8.89	8.85	8.81	8.79	8.74	8.70	8.66	8.64	8.62	8.59	8.57	8.55	8.53
4	7.71	6.94	6.59	6.39	6.26	6.16	6.09	6.04	6.00	5.96	5.91	5.86	5.80	5.77	5.75	5.72	5.69	5.66	5.63
5	6.61	5.79	5.41	5.19	5.05	4.95	4.88	4.82	4.77	4.74	4.68	4.62	4.56	4.53	4.50	4.46	4.43	4.40	4.36
6	5.99	5.14	4.76	4.53	4.39	4.28	4.21	4.15	4.10	4.06	4.00	3.94	3.87	3.84	3.81	3.77	3.74	3.70	3.67
7	5.59	4.74	4.35	4.12	3.97	3.87	3.79	3.73	3.68	3.64	3.57	3.51	3.44	3.41	3.38	3.34	3.30	3.27	3.23
8	5.32	4.46	4.07	3.84	3.69	3.58	3.50	3.44	3.39	3.35	3.28	3.22	3.15	3.12	3.08	3.04	3.01	2.97	2.93
9	5.12	4.26	3.86	3.63	3.48	3.37	3.29	3.23	3.18	3.14	3.07	3.01	2.94	2.90	2.86	2.83	2.79	2.75	2.71
10	4.96	4.10	3.71	3.48	3.33	3.22	3.14	3.07	3.02	2.98	2.91	2.85	2.77	2.74	2.70	2.66	2.62	2.58	2.54
11	4.84	3.98	3.59	3.36	3.20	3.09	3.01	2.95	2.90	2.85	2.79	2.72	2.65	2.61	2.57	2.53	2.49	2.45	2.40
12	4.75	3.89	3.49	3.26	3.11	3.00	2.91	2.85	2.80	2.75	2.69	2.62	2.54	2.51	2.47	2.43	2.38	2.34	2.30
13	4.67	3.81	3.41	3.18	3.03	2.92	2.83	2.77	2.71	2.67	2.60	2.53	2.46	2.42	2.38	2.34	2.30	2.25	2.21
14	4.60	3.74	3.34	3.11	2.96	2.85	2.76	2.70	2.65	2.60	2.53	2.46	2.39	2.35	2.31	2.27	2.22	2.18	2.13
15	4.54	3.68	3.29	3.06	2.90	2.79	2.71	2.64	2.59	2.54	2.48	2.40	2.33	2.29	2.25	2.20	2.16	2.11	2.07
16	4.49	3.63	3.24	3.01	2.85	2.74	2.66	2.59	2.54	2.49	2.42	2.35	2.28	2.24	2.19	2.15	2.11	2.06	2.01
17	4.45	3.59	3.20	2.96	2.81	2.70	2.61	2.55	2.49	2.45	2.38	2.31	2.23	2.19	2.15	2.10	2.06	2.01	1.96
18	4.41	3.55	3.16	2.93	2.77	2.66	2.58	2.51	2.46	2.41	2.34	2.27	2.19	2.15	2.11	2.06	2.02	1.97	1.92
19	4.38	3.52	3.13	2.90	2.74	2.63	2.54	2.48	2.42	2.38	2.31	2.23	2.16	2.11	2.07	2.03	1.98	1.93	1.88
20	4.35	3.49	3.10	2.87	2.71	2.60	2.51	2.45	2.39	2.35	2.28	2.20	2.12	2.08	2.04	1.99	1.95	1.90	1.84
21	4.32	3.47	3.07	2.84	2.68	2.57	2.49	2.42	2.37	2.32	2.25	2.18	2.10	2.05	2.01	1.96	1.92	1.87	1.81
22	4.30	3.44	3.05	2.82	2.66	2.55	2.46	2.40	2.34	2.30	2.23	2.15	2.07	2.03	1.98	1.94	1.89	1.84	1.78
23	4.28	3.42	3.03	2.80	2.64	2.53	2.44	2.37	2.32	2.27	2.20	2.13	2.05	2.01	1.96	1.91	1.86	1.81	1.76
24	4.26	3.40	3.01	2.78	2.62	2.51	2.42	2.36	2.30	2.25	2.18	2.11	2.03	1.98	1.94	1.89	1.84	1.79	1.73
25	4.24	3.39	2.99	2.76	2.60	2.49	2.40	2.34	2.28	2.24	2.16	2.09	2.01	1.96	1.92	1.87	1.82	1.77	1.71
26	4.23	3.37	2.98	2.74	2.59	2.47	2.39	2.32	2.27	2.22	2.15	2.07	1.99	1.95	1.90	1.85	1.80	1.75	1.69
27	4.21	3.35	2.96	2.73	2.57	2.46	2.37	2.31	2.25	2.20	2.13	2.06	1.97	1.93	1.88	1.84	1.79	1.73	1.67
28	4.20	3.34	2.95	2.71	2.56	2.45	2.36	2.29	2.24	2.19	2.12	2.04	1.96	1.91	1.87	1.82	1.77	1.71	1.65
29	4.18	3.33	2.93	2.70	2.55	2.43	2.35	2.28	2.22	2.18	2.10	2.03	1.94	1.90	1.85	1.81	1.75	1.70	1.64
30	4.17	3.32	2.92	2.69	2.53	2.42	2.33	2.27	2.21	2.16	2.09	2.01	1.93	1.89	1.84	1.79	1.74	1.68	1.62
40	4.08	3.23	2.84	2.61	2.45	2.34	2.25	2.18	2.12	2.08	2.00	1.92	1.84	1.79	1.74	1.69	1.64	1.58	1.51
60	4.00	3.15	2.76	2.53	2.37	2.25	2.17	2.10	2.04	1.99	1.92	1.84	1.75	1.70	1.65	1.59	1.53	1.47	1.39
120	3.92	3.07	2.68	2.45	2.29	2.17	2.09	2.02	1.96	1.91	1.83	1.75	1.66	1.61	1.55	1.50	1.43	1.35	1.25
∞	3.84	3.00	2.60	2.37	2.21	2.10	2.01	1.94	1.88	1.83	1.75	1.67	1.57	1.52	1.46	1.39	1.32	1.22	1.00