

一、選擇題(每題 3 分，共 30 分，請作答於試卷內之「選擇題作答區」)

1. Tuna fish and some large reptiles are examples of
 - A. poikilotherms that are partially endothermic
 - B. endotherms that are partially poikilothermic
 - C. homeotherms that are partially ectothermic
 - D. poikilotherms that are always endothermic
 - E. endotherms that are always poikilothermic
2. The doubling time for a human population with $r = 0.001$ is
 - A. 40 years.
 - B. 7 years.
 - C. 540 years.
 - D. 700 years.
 - E. 1000 years
3. If a competition coefficient is less than one, this means that
 - A. an intraspecific competitor has more of an inhibitory effect than the interspecific competitor.
 - B. there is little difference in the competitive abilities of intraspecific and interspecific competitors.
 - C. the interspecific competitor has about the same effect as an intraspecific competitor.
 - D. the interspecific competitor has more of an inhibitory effect than an intraspecific competitor.
 - E. None of the above
4. Which of the following phenomenon triggers an ENSO (El Niño-Southern Oscillation) event?
 - A. depletion of ozone layer
 - B. development of an unusually cold high-pressure air mass in the Antarctic region
 - C. a major volcanic eruption, which cools global climate by several degrees Celsius
 - D. reversal of high and low pressure areas in the equatorial central Pacific Ocean
 - E. global warming causing arctic ice melt and rise of sea level
5. Which of the following is most true?
 - A. Large seeds are characteristic of r-selected plants
 - B. Coexistence of closely related species having similar niches is promoted by niche displacement
 - C. Density-independent factors tend to destabilize populations
 - D. Brood parasitism is a form of competition
 - E. Extreme fluctuations of populations most often are caused by changes in number of predators
6. The mating system of a species may be influenced by:
 - A. habitat type
 - B. age of the animal
 - C. changes in population density
 - D. primary sex ratio of the population
 - E. food abundance
7. A keystone species
 - A. is important in community function because it is abundant
 - B. is important in community function because it is rare
 - C. is important in community function because it is a top predator
 - D. is important in community function because it is a primary producer
 - E. is important in community function because it has a disproportion impact relative to its abundance

8. Consider a standard optimal foraging model for three food types. Which of the following factors affect whether the 2nd most profitable food is eaten when encountered?
- A. abundance of the most profitable food
 - B. abundance of the 2nd most profitable food
 - C. abundance of the least profitable food
 - D. abundance of the 2nd most profitable food and least profitable food
 - E. None of the above
9. Which of the following statements is most true?
- A. predators kill their prey, grazers do not
 - B. parasites have a broader host range than do grazers
 - C. decomposers are autotrophs
 - D. polyphagous organisms can change their color at will
 - E. Plants with large seeds typically occur early in succession
10. Which statement about random, regular and clumped patterns within populations is most true?
- A. Patterns influence mean population density.
 - B. Patterns have no effect on competition among specific individuals within the population.
 - C. The type of pattern depends on the scale that you are observing the population.
 - D. Competition probably has no effect on the pattern you observe.
 - E. Predation will facilitate regular distribution pattern

二、解釋下列名詞 (每題 5 分，共 25 分)

- 1. life table and survivorship curve
- 2. ecotypes and adaptation
- 3. niche differentiation and character displacement
- 4. bottom-up vs. top-down control of ecological process
- 5. life history, r and K selection

三、繪圖題(依據題目繪出最適當的圖型，並標示必要的註解，如座標軸、單位、尺度等，每題 5 分，共 20 分)

- 1. Temperature profile with water depth for a temperate lake in summer, fall and winter (with curve of each season clearly labeled)
- 2. Type I, II, and III functional response curve (with curve of each type clearly labeled)
- 3. Coexistence in the Lotka-Volterra model of competition
- 4. Number of species on an island based on the theory island biogeography: (a). effect of distance from mainland, (b). effect of island size

四、問答題

- 1. What is "Ecology"? Name the main levels of study in Ecology. Write a question asked by ecologists working at each level. (15 分)
- 2. Draw a diagram of the global carbon cycle, label major reservoirs and flows. Explain why human caused changes to the global carbon cycle are affecting earth's climate. (10 分)