國立臺灣大學 102 學年度碩士班招生考試試題

一、選擇題 (每題 3 分，共 30 分) 請於試卷內之「選擇題作答區」依序作答。

1. Most humans eat a well balanced diet made up of a combination of meat and vegetables. How would you describe a human?
   A) autotrophs. B) herbivores. C) carnivores. D) omnivores.
2. What is the major role of decomposers in an ecosystem?
   A) increasing entropy. B) recycling of energy back into the ecosystem.
   C) recycling matter back into the ecosystem. D) photosynthesis.
3. Which of the following equations would model a mutualistic relationship between species 1 and 2? r_1 and K_1 is the growth rate and carrying capacity of species 1, and α is a positive value representing interaction strength.
   A) $\frac{dN_1}{dt} = r_1 N_1 * \left(\frac{K_1 - N_2 + \alpha N_2}{K_1}\right)$. B) $\frac{dN_1}{dt} = r_1 N_1 * \left(\frac{K_1 - N_2 - \alpha N_2}{K_1}\right)$. C) $\frac{dN_1}{dt} = r_1 N_1 * \left(1 - \frac{N_2 + \alpha N_2}{K_1}\right)$. D) none of the above.
4. A host species which harbors only a developmental phase of a parasite is called a(n)
   A) intermediate host. B) direct host. C) definitive host. D) macrohost.
5. When we say that one organism is more fit than another organism we mean that it
   A) lives longer than others of its species. B) competes for food more successfully than others of its species.
   C) mates more frequently than others of its species. D) leaves more viable offspring. (copies of its genes) than others of its species.
6. Which term describes the competition between two killer whales for seals as food?
   A) interspecific. B) specific. C) non-specific. D) intraspecific.
7. In shallow ponds algae grow in the warm water of summer, die in the fall, sink to the bottom, decay which adds nutrients to the water to begin another season of algae growth. Over time the shallow pond begins to fill in creating a stagnant ecosystem. What term best describe this process?
   A) primary succession. B) eutrophication. C) oligotrophism. D) denitrification.
8. What factors increase a species' vulnerability to extinction?
   A) small local population. B) narow habitat range (habitat specialist).
   C) small geographic range. D) all of the above.
9. Which of the following is a density-dependent factor limiting the growth of populations?
   A) space for mussels to settle. B) damages caused by floating logs to mussel beds.
   C) human harvesting on mussel D) damages caused by hurricanes
10. Which of the followings is NOT an adaptation of some deep-water fishes?
    A) big mouth. B) colorful. C) fluorescence. D) sharp teeth.

二、名詞解釋 (每題 4 分，共 20 分)

1. Mimicry 2. Bioaccumulation 3. Allopatric 4. Resilience 5. Homeostasis

三、簡答題 (每題 10 分，共 50 分)

1. Assume that trophic efficiency for phytoplankton-animal energy transfer is 10%, animal-animal energy transfer is 50%. a) How many kg of phytoplankton would it take to produce 70 kg of human biomass if that phytoplankton is first eaten by sardines, the sardines are eaten by tuna, and the tuna is eaten by humans? b) How many kg of sardines would it take to produce 70 kg of human biomass if the humans ate the sardines directly? How many kg of phytoplankton if the humans ate the phytoplankton directly?
2. Contrast r- Versus K-selective strategy of organisms. List 5 life history or ecological traits for each strategy.
3. List three levels of biodiversity. Draw a graph to show the relationship between ecosystem function and biodiversity. Explain why you see the relationship.
4. Based on the following life table:

Age: x	Survival schedule l(x)	Fecundity: b(x)	Survival probability: p(x)
0	1	0	
1	0.5	0	
2	0.4	2	
3	0.2	2	
4	0.05	0	
5	0	--	--

   A) Calculate (or show how to calculate) the annual survivorship for each age class (i.e., fill in the p(x) column in the table). B) Using the life table, calculate the net reproductive rate of dragon (R_0). C) Will this population increase, decrease, or not change in size through time (assuming the life table remains constant)?
5. You are studying competition between red and grey foxes, which potentially share similar food resources. You suspect that character displacement might be occurring in jaw size, so you measure the jaw length (in mm) of foxes in allopatric and sympatric populations. Here are the results you obtain:

	Allopatric populations	Sympatric populations
Red fox	120 mm	100 mm
Grey fox	80 mm	100 mm

Do these data appear to confirm or refute the hypothesis of character displacement in jaw length? Explain your answer.

試題隨卷繳回