

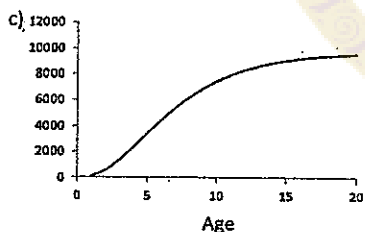
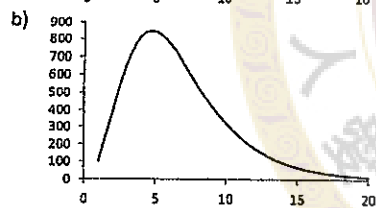
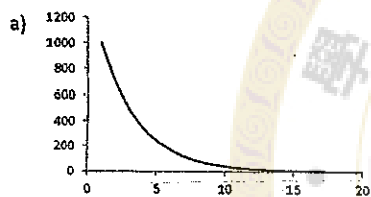
答案請填寫於試卷內，附上題號，並依序作答。可用中文或英文作答。

一、填充題 (答案請填寫於試卷內，勿於試題上作答)

a) (每格 2 分，共 8 分) Large-sized or relatively old fish tend to have (1) fecundity, (2) egg sizes and (3) spawning seasons, thus have relatively (4) contribution to population growth.

b) (每格 3 分，共 6 分) Based on Pauly et al.'s analysis of global landing data during 1950-1994 (Pauly et al.1998), the mean trophic level of catch (1) over time. This is also known as "Fishing (2) marine food webs" phenomenon.

c) (前三格 2 分，第四格 3 分，共 9 分) The x-axes for all three figures below are ages. Identify the y-axes for these figures: figure (1) describes average individual growth pattern. Figure (2) shows cohort survival pattern. Finally, figure (3) shows age-specific stock biomass. Based on these figures, it is best harvesting the population around age (4).



二、解釋名詞(每題 5 分，共 25 分)

- a) Match-mismatch hypothesis
- b) Density-dependent population growth
- c) Catch-per-unit-effort
- d) Maximum sustainable yield
- e) Exclusive economic zones

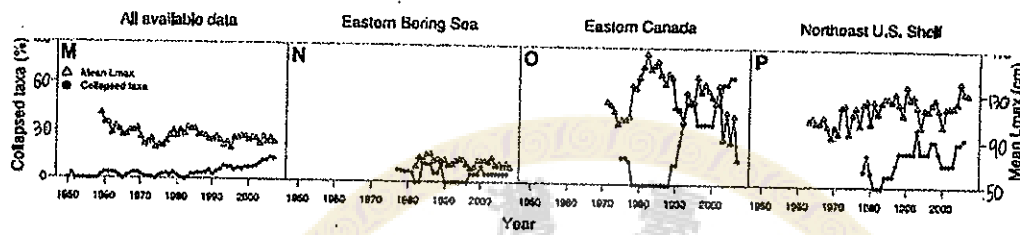
三、簡答及計算題

- a) (10 分) What is "foodweb"? How does fishing alter ecosystem structure or functions through foodweb?

見背面

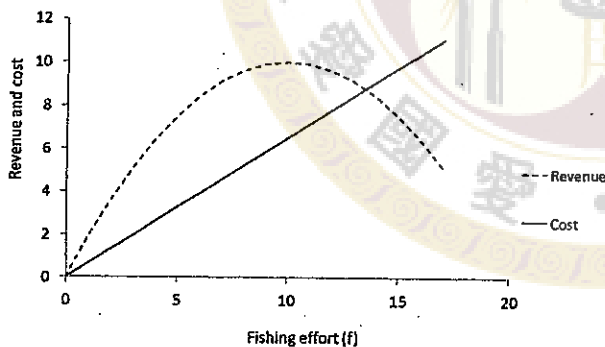
b) (各 3 分，共 6 分) Describe two mechanisms via which climate change affects fishery production.

c) (各 8 分，共 16 分) Based on the figures below (Worm et al. 2009), interpret variation in a) percent of depleted fisheries stocks and b) mean of maximum length of fish (L_{max}) globally and among ecosystems.



d) (10 分) Mark-recapture is a common method for estimating population abundance of mobile species (e.g., fish). Assuming no migration, no tag loss, and equal survival and catchability for all individuals, use the following data to determine population abundance (N):
 Originally marked individuals = 100
 Subsequent catch number = 120
 Number of marked individuals caught = 12

e) (10 分) 答案請填寫於試卷內，勿於試題上作答。The figure below describes revenue and cost for operating a fishery. Draw on this figure on your paper and indicate the fishing effort and revenue that achieve the highest net profit.



試題隨卷繳回