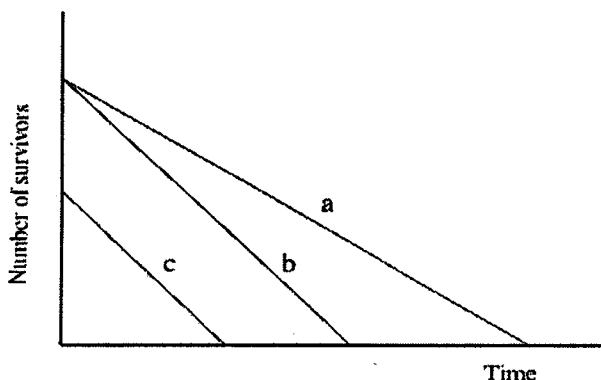


1. 人類細胞中有已知核酸序列的 X 基因, 但其功能尚未定出, 請設計實驗來研究 X 基因的功能。(10%)
2. What is RNA interference (RNAi)? (10%)
Please include in your answer a brief description on the molecular mechanisms of RNAi in mammalian systems and the comparison between this method and knockout technique. (10%)
3. Please describe the difference and similarity between immunofixation and immunoelectrophoresis. (10%)
4. A graph below shows the time it takes to kill populations of the same microorganism under different conditions. What conditions would explain the differences in lines a, b, and c. (10%)



5. Answer the following questions: (10%)

(A) Define **Stem Cell**.

(B) Why is the stem cell technology a very important field in biomedical research?

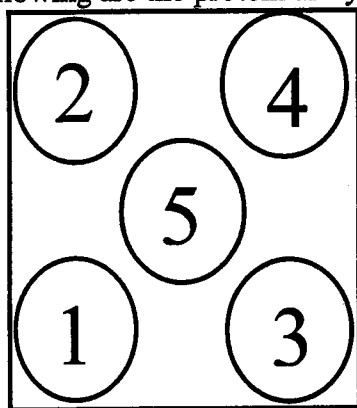
(C) What are the major **sources** of stem cells in human body?

What are the **common techniques** to isolate stem cells from a pool of various types of cells? State the principles for these techniques.

(背面仍有題目, 請繼續作答)

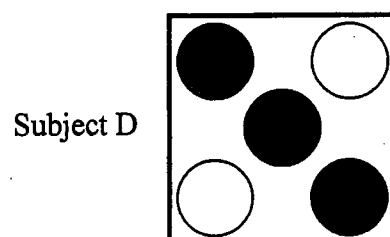
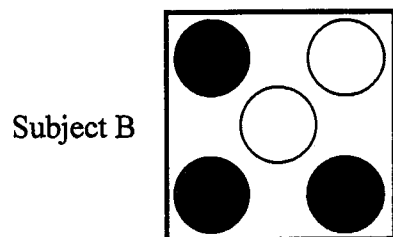
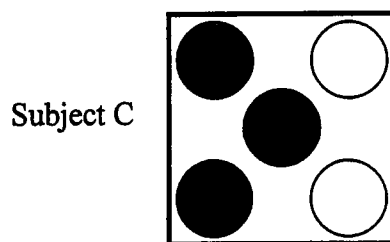
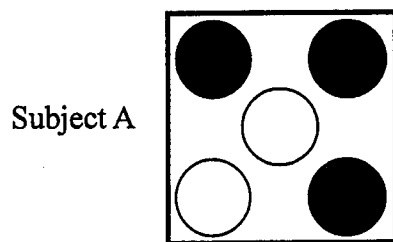
6. You are a scientist at the NCKU conducting a study to find the proteins associated with **smelly feet**. You have been given the protein profiles of 4 subjects with different degrees of foot smelliness. By identifying the proteins that are commonly found in people with smelly feet, you might be able to come up with treatments that make their feet less foul. (10%)

The following are the protein arrays for the sweat study



- 1 Stinkin – a bad-smelling protein
- 2 Revoltin – a very bad-smelling protein
- 3 Deodorase – binds with revoltin to neutralize its smell
- 4 Fragrin – a good-smelling protein
- 5 P-U Factor – interacts with Stinkin to make a very very bad-smelling complex; without Stinkin it has no odour

The four subjects were found to have the following proteins in their sweat (Black shaded circles indicate the protein is present, white circles indicate absence of protein) :



According to the protein profiles

- (1) Who has the worst-smelling feet? Why?
- (2) Who has the most pleasant smelling feet? Why?
- (3) Whose feet smell the least? Why?

編號：F1 502 系所：醫學檢驗生物技術學系甲組、乙組 科目：生物技術

7. 請利用至少五種生物技術設計一個實驗流程來尋找腫瘤標記(tumor marker)。(10%)
8. 如果您在研究中發現一個新的未知功能的基因 (Novel gene)，接下來有那些生物技術是可以應用來探討其功能，請列出五種您所知道的。(10%)
9. What is reverse genetics-based vaccine? Please use influenza A virus as an example to describe how to generate reverse genetics-based vaccine. (10%)
10. Describe the principle and application of real-time PCR. (10%)