

※ 考生請注意：本試題不可使用計算機。請於答案卷(卡)作答，於本試題紙上作答者，不予計分。

1. The structure of a gene composes of several parts such as promoter region, 5' untranslated region (5'UTR), coding region, and 3'UTR. Please indicate the function of each parts and how can they control the expression level of this gene. (20%)
2. During DNA replication, some errors happen. If a mis-incorporated nucleotide is not corrected, it is called mutation. Please describe the potential consequences of a mis-incorporated mutation. (20%)
3. A mammalian cell will divide and become two daughter cells, which takes several steps to complete. Please describe the four major stages of a cell cycle and what kinds of processes are happening in each stage. If we would like to speed up the cell cycle, which stage is the most likely one to be shortened? (20%)
4. Please explain why eukaryotic cells require a nucleus as a separate compartment when prokaryotic cells can manage perfectly well without. (20%)
5. Stem cells are a group of cells that can differentiate into different types of cells. Recently, scientists can reverse the somatic cells back to the undifferentiated cells, called induced pluripotent stem cells (iPSC). If you have this technique to generate iPSC, what is the first priority to apply this technique for? Please specify your reason. (20%)