1. Please interpret each figure and answer the questions (10%)

(A) Please make a conclusion for this figure and describe how you reach your conclusion.

(B) Please describe the hypothesis for designing this experiment and what is the conclusion for their data.
2. Please describe at least two different types of cell death and their characteristics and two techniques used to analyze cell death (10%).

3. Please make a comparison between the phenotypes of transformed and non-transformed cells (5%).

4. Please indicate five cellular features ONLY found in eukaryotic cells (10%).

5. Please describe the significance for eukaryotic cells to maintain high Na⁺ level outside the cells (7%).

6. Please describe two routes for proteins targeting to the lysosome (8%).

7. GPCR (G protein-coupled receptors) signaling usually have short-term effects in the cell by quickly modifying existing proteins. Please consider the signature of GPCR signaling and answer the questions: (1) activated G-protein-coupled receptor acts as a GEF or GAP? (2) active effector acts as a GEF or GAP? (4%)

8. Please describe the molecular events required for full activation of protein kinase B/AKT. (6%)

9. Please describe the contributions of APC<sup>cdh1</sup> in mitotic exit. (5%)

10. Addition of growth factors to G0-arrested mammalian cells induces a series of events to return G0 cells to the cell cycle. Please describe the series of events by which the growth factors-induced signaling promotes the cell cycle progression. (10%)

11. Please describe the types of cell-cell adhesions. (10%)

12. Please describe the components of extracellular matrix. (10%)

13. What are filopodia and lamellipodia? (5%)