1. A small continent on the map has eight different countries (A B C D E F G H) on it. Among the countries, A is adjacent to FBED, B is adjacent to FEACH, C is adjacent to BHG, D is adjacent to AFG, E is adjacent to AB, F is adjacent to BDAHG, G is adjacent to CFD, and H is adjacent to FCB. If two adjacent countries are NOT supposed to have the same color, then what is the minimum number of colors that the continent would have? (Please answer in detail) (25%)

2. Four actors (男演員) and four actresses (女演員) are to couple (配對) in a movie, one actor will be coupled with exactly one actress and vice versa. Mr. A is 26 years old, Mr. B is 25, Mr. C is 30, Mr. D is 21, Ms. E is 20, Ms. F is 33, Ms. G is 28, and Ms. H is 24. However, there are preferences (喜好) among the actors and actresses. CFB will couple only to younger partners. AG do not want partners that have more than 2 years' difference. H wants a partner who is not older for more than 2 years. E wants a partner who is not older for more than 5 years. If you are the director of the movie, what is a feasible arrangement for the actors and actresses? (Please answer in detail) (25%)
3. Questions regarding industrial robot (工業機器人) and its power supply (動力源): (Please answer as detailed as possible.)
   a. Please describe the fundamental components (基本組成部分) of an industrial robot? (8%)
   b. The power supply unit of a robot can be classified into three categories: pneumatic (氣壓), electric (電氣), and hydraulic (液壓). Please compare the payloads (負載) for these three types of power supplies? (7%)
   c. For a double-action pneumatic cylinder (雙動氣壓缸), please describe how it works using the three statuses shown in Fig. 1? (10%)

4. Questions regarding milling machine (銑床) and its coordinate systems (座標系統): (Please answer as detailed as possible.)
   a. For a milling machine, please describe how the so-called X-axis, Y-axis, and Z-axis in the programming coordinate system (程式座標系) are defined in general? (10%)
   b. After the programming coordinate system is defined, please draw a Cartesian coordinate system (卡式座標系) on the answer sheet (答案紙) to point out the X, Y, and Z programming coordinates for the machine depicted in Fig. 2? (7%)
   c. Finally, please describe the definition difference between programming coordinate system and machine coordinate system (機械座標系)? (8%)

Fig. 1

Fig. 2