註：請依題號順序作答，字需體清晰。

一、A people throws one dice twice - the number will be denoted by (x_1, x_2).　　**15%**

supposed event E1{(x_1, x_2) | $x_1 >= 2*x_2$}, and E2(x_1, x_2) | $x_1+x_2=9$},

1)List all possible combinations (x_1, x_2) of for event E1 and E2.　　4%

2)List all possible sequences (x_1, x_2) in E1∩E2.　　4%

3)Find out the probability P(E1) and P(E2−E1)　　7%

二、【Exact cover】 Let U={1,2,3,4,5,6,7,8},subset A={2,5,7}, B={1,2,3, 4, 8},　　**20%**

C={3,4,6,8}, D={2,5,6,7}, E={4, 6, 8}.

1)Please give the algorithm X for . Exact cover　　8%

2)find the matrix M for presenting all the subsets above.　　4%

3)Apply algorithm X to find an exact cover.　　8%

(ps. All the procedures must be held in your answer sheet.)
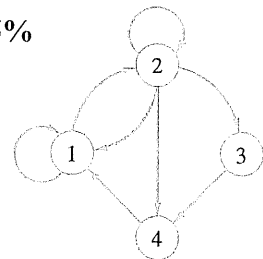
三、A digraph picture R is shown in right side.　　**25%**

1)what are the in-degree and out-degree for all the vertices.　　5%

2)Show the matrix M_R for the digraph.　　5%

3)find M_R^2　　5%

4)Please describe the definition of M_R^∞ and then find M_R^∞　　10%

四、1) i)二元樹，ii) n-tree 之圖形。假設上述的 tree 有 m 層，請求出整棵樹可能之最大節點數與最小節點數。**15%**

(根節點 root 設為第 1 層)　　10%

2)說明 Euler path 特性。　　5%

五、設有一數學式: S=(1 * 2) / (3 + 4) + 5 * (6 / 7)　　**25%**

1)繪出此數學式之二元樹(binary tree)　　7%

2)請寫出 preorder 演算法之擬虛碼。　　6%

3)請依 postorder 演算法走訪此樹，寫出走訪的結果。　　6%

4) inorder 演算法有何缺點? 請說明!　　6%