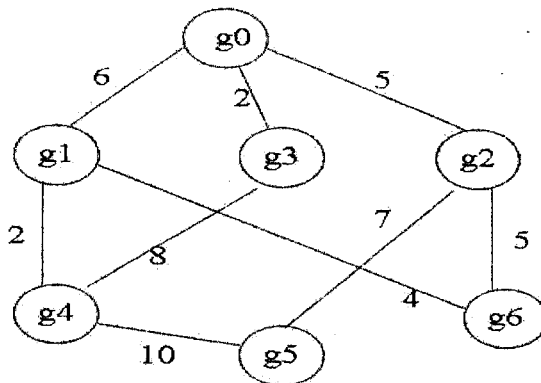


所別：生物資訊與系統生物研究所碩士班 科目：計概與資料結構

- 一、(20%) (a) What's a data type? Please list two data types in C.
- 二、(10%) Assume 2's complement representation is used in a number system and the length of an integer is 4 bits. Please perform the following two four-bits binary operations: (a) 5+4; (b) 3-4
- 三、(10%) Assume  $f(1)=f(2)=1$ ,  $f(n)=f(n-1)+f(n-2)$   
Please write a *recursive* program in C to compute  $f(n)$ .
- 四、(20%) Please build a heap (MAX-heap) from the following list numbers :  
44, 30, 50, 22, 60, 55, 77, 55
- 五、(20%) Given a gene regulation network as follows:



A weight between two genes indicates the strength between them. Please find a subnetwork using a minimum spanning tree approach.

- 六、(20%) Assume a protein sequence is composed  $a, e, i, s, t, b$  and  $n$  amino acids.  
The frequency of occurrence of the amino acids in a protein is given below.

amino acids	frequency
a	10
e	15
i	12
s	3
t	4
b	13
n	1

Please design a code table for the protein such that the code in the code table minimizes the length of the protein. Using this code, how many bits are encoded for this protein.