所別： 企業管理學系 碩士班 企業電子化與大數據戊組(一般生)　　　共 1 頁　第 1 頁

科目： 資料結構

本科考試禁用計算器

1　(30 points) Write the postfix and prefix expression for the following infix expressions.

　　(1)　$p/q-x+y*z-p*q$　　　　　*(15 points)*

　　(2)　$p*(q+r)/s-t$　　　　　*(15 points)*

2　(30 points) Assume that we have information on the employees of a firm as shown in the following table.　For each employee, we have their following attributes: ID number, name, occupation, and location.　We would like to quickly access employee's information using any of these attributes.　For example, we might want to quickly retrieve the list of all employees who work in New York, or the list of all programmers.　What is the data structure meet these requirements, as well as all of the following:

　(1) allow insertion and retrieval any employee easily

　(2) any employee data is not stored twice

　(3) able to scale up to huge number of records

Please show your data structure using the following example data and explain how the *insert*, *delete*, and *search* operations should be done.

Node	ID Number	Name	Occupation	Location
A	10	Mary	Accountant	Taipei
B	20	Kathy	Consultant	Taichung
C	30	Maria	Programmer	Tainan

3　(40 points) How to find the 1/3-th element(s) of a linked list in one pass? For example, if the linked list has 30 elements, the 10-st element is the 1/3-th element in the list.　If the linked list has 31 elements, then both the 10-th and the 11-st ones should be returned as answer. If the linked list has 32 elements, then the 10-th, the 11-st, and the 12-nd ones are returned as answer.　Please describe your concept, and write the program in C, C++, or Java.