

國立臺北教育大學 98 學年度學士班轉學考試

學系 (組)：資訊科學系

年 級：三年級

科 目：資料結構

(本試題共兩頁)(每題 10 分，總分 100 分)

1. Imagine you have a stack of integers, **S**, and a queue of integers, **Q**. Draw a picture of **S** and **Q** after the following operations:
Step 1. pushStack (**S**, 3)
Step 2. pushStack (**S**, 12)
Step 3. enqueue (**Q**, 5)
Step 4. enqueue (**Q**, 8)
Step 5. popStack (**S**, x)
Step 6. pushStack (**S**, 2)
Step 7. enqueue (**Q**, x)
Step 8. dequeue (**Q**, y)
Step 9. pushStack (**S**, x)
Step 10. pushStack (**S**, y)
2. Write the LIFO and FIFO insertion algorithms for general trees?
3. Write an algorithm that creates a mirror image of a binary tree. All left children become right children and vice versa.
4. Write a recursive algorithm to add the first n elements of the series:
 $1 + 1/2 + 1/3 + 1/4 + 1/5 + 1/6 + \dots + 1/n$
5. Balance the AVL tree in Figure (1). Show the balance factors in the result.

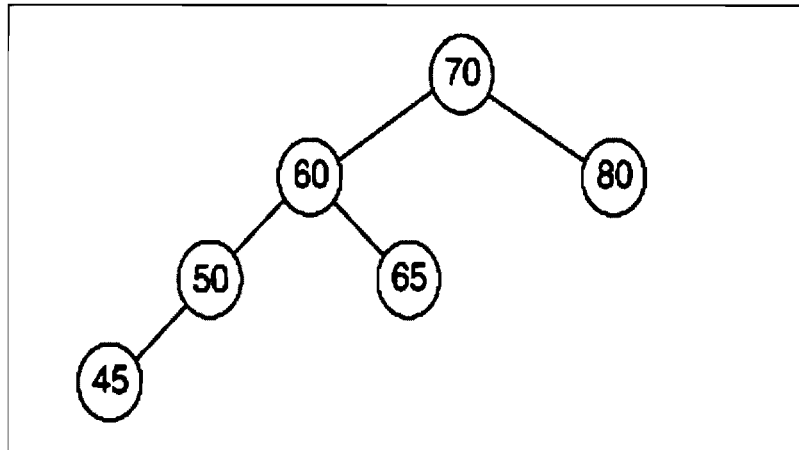


Figure (1)

6. After two passes of a sorting algorithm, the following array:
 80 72 66 44 21 33
 has been rearranged as shown below.
 21 33 80 72 66 44
 Which sorting algorithm is being used (straight selection, bubble, or straight insertion)? Defend your answer.

7. Write the C code for the Algorithm of “Reheap UP”?

8. Write a recursive algorithm that calculates and returns the length of a list.

9. What is the Algorithm of “Reheap Down”, please build a minimum heap.

10. An array contains the elements shown below. Using the binary search algorithm, trace the steps followed to find 20. At each loop iteration, including the last, show the contents of **first**, **last**, and **mid**.
 18 13 17 26 44 56 88 97