DS HW1

Deadline(107/10/2)

手寫題

8. Determine the big-O notation for the following:
   a. $5n^{5/2} + n^{2/5}$
   b. $6\log(n) + 9n$
   c. $3n^4 + n\log(n)$
   d. $5n^2 + n^{3/2}$

12. If the efficiency of the algorithm `doIt` can be expressed as $O(n) = n^2$, calculate the efficiency of the following program segment:

```
for (i = 1; i <= n;; i++)
    for (j = 1; j < n, j++)
         doIt (...)
```

14. Given that the efficiency of an algorithm is $5n^2$, if a step in this algorithm takes 1 nanosecond (10^{-9} seconds), how long does it take the algorithm to process an input of size 1000?

22. Write a compare function (see Program 1-6) to compare two strings.

PROGRAM 1-6 Compare Two Integers

```
/* Demonstrate generic compare functions and pointer to
   function.
      Written by:
      Date:
*/
#include <stdio.h>
#include <stdlib.h>
#include "P1-05.h"                          // Header file

int   compare (void* ptr1, void* ptr2);

int main (void)
{
// Local Definitions

   int i = 7 ;
   int j = 8 ;
   int lrg;

// Statements
   lrg = (*(int*) larger (&i, &j, compare));

   printf ("Larger value is: %d\n", lrg);
   return 0;
}  // main
/* ================== compare ==================
   Integer specific compare function.
      Pre  ptr1 and ptr2 are pointers to integer values
      Post returns +1 if ptr1 >= ptr2
           returns -1 if ptr1 <  ptr2
*/
int compare (void* ptr1, void* ptr2)
```

continued

PROGRAM 1-6 Compare Two Integers *(continued)*

```
33  {
34    if (*(int*)ptr1 >=  *(int*)ptr2)
35       return 1;
36    else
37       return -1;
38  }  // compare
```

```
Results:
Larger value is: 8
```

32. Rewrite Program 1-4 to create a list of nodes. Each node consists of two fields. The first field is a pointer to a structure that contains a student id (integer) and a grade-point average (float). The second field is a link. The data are to be read from a text file.

    Then write a program to read a file of at least 10 students and test the function you wrote. You will also need to use the generic compare code in Program 1-6 in your program.

PROGRAM 1-4 Create List with Two Linked Nodes

```
 1  /* Create a list with two linked nodes.
 2        Written by:
 3        Date:
 4  */
 5  #include <stdio.h>
 6  #include <stdlib.h>
 7  #include "P1-02.h"                        // Header file
 8
 9  int main (void)
10  {
11  // Local Definitions
12     int*  newData;
13     int*  nodeData;
14     NODE* node;
15
16  // Statements
17     newData  = (int*)malloc (sizeof (int));
18     *newData = 7;
19     node = createNode (newData);
20
21     newData    = (int*)malloc (sizeof (int));
22     *newData   = 75;
23     node->link = createNode (newData);
24
25     nodeData = (int*)node->dataPtr;
26     printf ("Data from node 1: %d\n", *nodeData);
27
28     nodeData = (int*)node->link->dataPtr;
29     printf ("Data from node 2: %d\n", *nodeData);
30     return 0;
31  }  // main
```

```
Results:
Data from node 1: 7
Data from node 2: 75
```