銘傳大學九十一學年度資訊工程研究所碩士班招生考試

第一節

計算機概論 試題

1. Determine the value, true or false, of each of the following Boolean expression. Assume that variable **count** = 0, variable **limit** = 10, Give your answer as one of the value true or false.
   1. (limit > 20) || (count < 5)
   2. !((count < 10) || (x < y) && (count > = 0))

   (10 points)
2. Convert the following **while** loop into a **for** loop.

```
int a = 5;
while(a < 15)
{       cout <<"Hello"<<endl;
        a = a + 2;
}
```

   (10 points)
3. Write a program to "merge" two sorted integer arrays into a new array. For example, three arrays are declared as follow:
   int **one**[5] = {3, 6, 9, 12, 15}
   int **two**[7] = {1, 2, 8, 10, 11, 13, 17}
   int **three**[12];
   After merging, contents in array **three** [] are
   1, 2, 3, 6, 8, 9, 10, 11, 12, 13, 15, 17

   (15 points)
4. Every node in a binary tree has the following structure:

```
struct node {       int       data;
                    struct node * leftchild;
                    struct node * rightchild;}
```

   The root of the binary tree is pointed to by a pointer **T**. Write a complete function that will perform a **postorder** traversal.

   (15 points)
5. Write a complete function to sort the following array in ascending order. And estimate the exact running time and its relative big-O.
   int array[8] = {4, 9, 1, 3, 6, 50, 23, 5};

   (15 points)

6. Find the exact running time and its relative big-O of the following function. Show all the steps.

```
trip(i, j)
{ if (i = = j)
        return i;
  else{
        k = (j - i) / 2;
        return trip(i, k) + trip(k+1, j);
        }
}
```

(15 points)

7. Carefully define the big-O as g(n) = O(f(n))

(10 points)

8. Discuss the reason why all sorting algorithms based on comparison require at least $O(n \log_2 n)$ running time?

(10 points)

試題完