

八十五學年度國立台灣工業技術學院研究所碩士班招生考試

所別：管理技術研究所

學程別：資訊管理學程

組別：

科目：計算機概論

(1) (10 points) It takes two multiplications, one division, and two subtractions for computing the expression $(ab-cd)/(b-d)$. Please transform the expression into another expression such that it takes one multiplication, one division, one addition, and two subtractions. Note that decreasing the number of multiplications and divisions can often speed up the computation involved although we increase a few additions and subtractions.

(2) (10 points) Suppose n is the problem size and we have an equality $O(k \log k) = O(n)$, please determine k in terms of n . Note that the big- O notation is often used in complexity analysis and is defined in any standard textbook.

(3) (10 points) Given an n -th degree polynomial, $a_n x^n + a_{n-1} x^{n-1} + \dots + a_1 x^1 + a_0$, please write a recursive formula, i.e., iterative formula, to compute the polynomial.

(4) Study the following programs and answer the questions.

```
#include <fcntl.h>
int fdrd, fdwt;
char c;
main(argc, argv);
{
    int argc;
    char *argv[];
    {
        if (argc != 3) exit(1);
        if ((fdrd=open(argv[1], O_RDONLY)) == -1) exit(1);
        if ((fdwt=creat(argv[2], 0666)) == -1) exit(1);
        fork();
        rdwrt();
        exit(0);
    }
    rdwrt()
    {
        for (;;)
        {
            if (read(fdrd, &c, 1) != 1) return;
            write(fdwt, &c, 1);
        }
    }
}
```

Questions:



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- (a) (3 points) How many arguments are needed for this program?
- (b) (4 points) Describe the function of this program.
- (c) (4 points) Is there anything wrong with this program? Why?
- (5) (5 points) Explain the medium access control protocol used by Ethernet.
- (6) Let F be a family of nonempty sets. The intersection graph of F is obtained by representing each set in F by a vertex and connecting two vertices by an edge if and only if their corresponding sets intersect. For each of the following, construct a five members F set and draw the corresponding intersection graph:
- (a) (3 points) F consists of closed intervals on the real line.
- (b) (3 points) F consists of rectangles.
- (c) (3 points) F consists of arcs around a circle.
- (7) (10 points) (a) Show that among any $n+1$ positive integers not exceeding $2n$ there must be an integer that divides one of the other integers.
- (5 points) (b) Find n positive integers not exceeding $2n$ such that none divides the other.
- (8) (5 points) The following C function, *atoi*, is the "standard" technique for converting a sequence of digits in s string to a positive integer number:

```
int atoi(char *s)
{
    int n;
    for (n=0; *s >= '0' && *s <= '9'; s++)
        n = 10 * n + (*s - '0');
    return n;
}
```



Unfortunately, this function does not check for overflow and is therefore incorrect. Assuming that the maximum integer is *MAXINT*, rewrite this function to correctly check for overflow and call *overflow()* if it occurs.

- (9) (15 points) The three key elements in World-Wide Web are HTTP, HTML, and URL. Briefly explain the functionality of each element.
- (10) (10 points) Briefly explain the similarities and differences of OLE and DDE on Microsoft Windows environment.