

國立彰化師範大學 101 學年度碩士班招生考試試題

系所： 資訊工程學系

科目： 資料結構及程式設計

☆☆請在答案卷上作答☆☆

共 3 頁，第 1 頁

1. (6%) Write the output of the following program.

```
#define PROD(A, B)  A*B
#define DIV(A, B)   A/B

int main(void)
{
    printf("%d\n", PROD(2+3, 7));
    printf("%d\n", DIV(6, 2*3));
    return 0;
}
```

2. (6%) Write the output of the following program.

```
int func(int n)
{
    if(n<10)
        return n;
    else
        return func(n/10) + n%10;
}

int main(void)
{
    int n = 1489837652;
    printf("%d", func(n));
    return 0;
}
```

3. (8%) Write the output of the following program.

```
int i, j, a[3][4] = {{1,2,3,4}, {4,5,6,7}, {7,8,9,10}};
int (*p)[4] = a+2;
int *q = a[1];

p--;
for (i=0; i<3; i++)
    printf("%3d", *(*p+i));
printf("%3d", q[1]);
```

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共 3 頁，第 2 頁

4. (10%) Write the output of the following program.

```
void func1(int a, int b)
{ int tmp;      tmp = a;   a = b;      b = tmp;   }
void func2(int* a, int* b)
{ int tmp;      tmp = *a;  *a = *b;  *b = tmp;  }
void func3(int* a, int* b)
{ int *tmp;     tmp = a;   a = b;      b = tmp;   }
void func4(int** a, int** b)
{ int *tmp;     tmp = *a;  *a = *b;  *b = tmp;  }
void func5(int** a, int** b)
{ int tmp;      tmp = **a; **a = **b; **b = tmp; }

int main(void)
{
    int i=0, j=1;
    int *p=&i, *q=&j;

    func1(i, j);
    printf("%5d %5d %5d %5d\n", i, j, *p, *q);
    i=0; j=1; p=&i; q=&j; func2(p, q);
    printf("%5d %5d %5d %5d\n", i, j, *p, *q);
    i=0; j=1; p=&i; q=&j; func3(p, q);
    printf("%5d %5d %5d %5d\n", i, j, *p, *q);
    i=0; j=1; p=&i; q=&j; func4(&p, &q);
    printf("%5d %5d %5d %5d\n", i, j, *p, *q);
    i=0; j=1; p=&i; q=&j; func5(&p, &q);
    printf("%5d %5d %5d %5d\n", i, j, *p, *q);
    return 0;
}
```

5. (8%) Complete the “reverse” function which can reverse the elements’ order of an integer array (a[]) that is passed to it.

```
void reverse(int a[], int n) { }
int main()
{
    int i, a[7] = {1, 2, 3, 4, 5, 6, 7};
    reverse(a, 7);
    for (i=0; i<7; i++)
        printf("%d ", a[i]);
    return 0;
}
```

program output:

7 6 5 4 3 2 1

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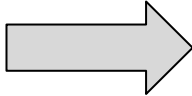
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共 3 頁，第 3 頁

6. (12%) Write a program to read the text file “data.txt” then change its format and write to another text file “newdata.txt” as shown below. ('.' represents space)

data.txt		newdata.txt
6::11.2		6...{...11.200}
18::33.56		18...{...33.560}
119::223.5		119...{...223.500}

Note: Your program should be able to read any number of records, not just three.

Filename should be read from command-line arguments. Assume the execution file, “data.txt” and “newdata.txt” are in the same directory.

The command-line for example: `programname.exe data.txt newdata.txt`

hint: `int fscanf(FILE *stream, const char *format, ...);`
`int fprintf(FILE *stream, const char *format, ...);`
`int main(int argc, char *argv[]);`

7. (20%) Consider a sequence of numbers: 29, 15, 23, 11, 31, 46, 25, 39, 41, 27, 18
(a) Construct a binary search tree for the sequence.
(b) Construct an AVL tree for the sequence.
8. (20%) Please write a recursive algorithm to find the greatest common divisor (GCD) of two positive integers.
9. (10%) Given array X which contains 29, 15, 23, 11, 31, 46, 25, 39, 41, 27, and 18. Please arrange the order of the elements such that array X becomes a min heap.