

ELEKTRIЈADA 2010

Čanj, May 19-24, 2010

INFORMATICS

Tasks

1 Find the output of the following program:

```
#include <stdio.h>
#define V(a,b,c) (((a)[(b)])=(c))
int main()
{
    int n=10, k=1, t, i;
    int v1[10]={2}, v2[10]={1}, v[10]={0};
    for (k=1; k<n; k++)
    {
        if (k<3) V(v,0,V(v,0,k));
        for (i=0; i<10; i++) V(v,i,V(v,i,0));
        for (i=t=0; i<10; i++) V(v,i++,t%10),t/=10
            t+=V(v1,i,v1[i])+V(v2,i,v2[i]);
        for (i=0; i<10; i++)
        {
            V(v2,i,V(v2,i,V(v1,i,V(v1,i,v1[i]))));
            V(v1,i,V(v1,i,V(v,i,V(v,i,v[i]))));
        }
        if (!(k%4))
        {
            for (i=9; i>0&&!V(v,i,v[i]); i--);
            while (i>=0) printf("%d", v[i--]);
            printf("\n");
        }
    }
    return (0);
}
```

2 Find the output of the following program:

```
#include <stdio.h>
long i=1, s, n=11, ok, nok;
void test(long x)
{
    int a; s=0;
    while (x) { a=x%10; s+=a*a; x/=10; };
    if ((s==1)|| (s==4)|| (s==i)) return;
    test(s);
}
int main()
{
    for(; i<n; ok+=s==1,nok+=s!=1,i++) test(i);
    printf("%d\n%d", ok, nok);
    return (0);
}
```

3 Find the output of the following program:

```
#include <stdio.h>
long i=9, ok, nok;
int test(long x)
{
    int a, s=0;
    while (x) { a=x%10; s+=a*a; x/=10; };
    if ((s==1)|| (s==4)|| (s==i)) return(s);
    return (test(s));
}
int main()
{
    for( ; i>=0; i--)
        test(i) ? ok++ : nok++;
    printf("%ld\n%ld", ok, nok);
    return (0);
}
```

4 Find the output of the following program:

```
#include <stdio.h>
#define M(a,b) a ## b
int fi(int i) { return i*i; }
int f0(int i) { return ++i; }
int fl(int i) { return --i; }
int f2(int i) { return i; }
typedef int (*ptf)(int);
int (*g(int i))(int) { return (M(f,i)); }
void k(int n, int b)
{
    do
        printf("%d",(*g(n%b))(n%b));
    while(n/=b);
}
int main()
{
    k(4,2); printf("\n"); k(14,3); return(0);
}
```

5 Find the output of the following program:

```
#include <stdio.h>
#define M 5
int n = 4;
int d[M][M]={{{},{1,2,3,5}},{},{10,8,1,13,2}};
int ok(int K)
{
    int i, x, p = 0;
    for (i=0; i<n-1; i++)
    {
        x = d[2][i] + p;
        if (x<K)
            p = x - K - (d[1][i+1]-d[1][i]);
        else
        {
            p = x - K - (d[1][i+1]-d[1][i]);
            if (p<0) p=0;
        }
    }
    return ((d[2][n-1] + p) >= K);
}
int main()
{
    int i, min=0, max=1, mid;
    for (i=0; i<n; i++)
    {
        d[2][i]=d[3][n-i];
        if (d[2][i]>max) max=d[2][i];
    }
    while (min<max)
    {
        mid = (min+max+1)/2;
        if (ok(mid))
            min=mid;
        else
            max=mid-1;
    }
    printf("%d ", min);
    return (0);
}
```

6 Find the output of the following program:

```
#include <stdio.h>
#include <stdlib.h>
typedef struct nd {int v,c; struct nd *p;} my;
my *kor = NULL;
int f(int v)
{
    my *c = kor;
    while (c)
    {
        if (c->v == v) return 1; c = c->p;
        if (c == kor) break; continue;
    }
    return (0);
}
void add(int v)
{
    my *c, *t;
    do if (f(v%10))
    {
        c = kor;
        while (c)
        {
            if (c->v == v%10) break; c = c->p;
            continue;
        }
        c->c++;
    } else {
        t = (my*)malloc(sizeof(my));
        t->v = v%10; t->c = 1;
        t->p = (kor==NULL)? t : kor->p;
        kor = (kor==NULL)? t : kor;
        kor->p = t;
    }
    while (v/=10);
}
int main()
{
    int i=0;
    while (i<100) add(i++);
    while (kor)
    {
        if (kor->v == 0) break; kor = kor->p;
        continue;
    }
    printf("%d %d\n", kor->v, kor->c);
    printf("%d %d", kor->p->v, kor->p->c);
    return (0);
}
```

7 Find the output of the following program:

```
#include<stdio.h>
int main()
{
    int i, j, c, g[8]={0};
    for (i=0; i<15; i++)
    {
        for (j=0; g[j]; j++) g[j]=0; g[j]=1;
        if (i%4==3)
        {
            for (j=i/4+1; j>=0; j--)
            {
                c = g[j]&&!g[j+1]||!g[j]&&g[j+1];
                printf("%d", c);
            }
            printf("\n");
        }
    }
    return (0);
}
```

8 Choose the answers for the following questions (correct answer = 5 pts / wrong answer = -1 pt):**1. What is the correct output of the following C code?**

```
#include <stdio.h>
#define M(a,b) a%:b
main()
{
    int a=1, b=2, ab[]={10,20}, c;
    printf( "%d", M(a,b)<:a:> );
    printf( "%d", M(a,b)<:a:>?a:b );
    printf( "%d", c=M(a,b)<:a:>?a:b );
}
```

(a)	(b)	(c)	(d)	(e)
1110	2011	20101	20201	202020

2. What is the correct output of the following C code?

```
#include <stdio.h>
#include <string.h>
#include <stdlib.h>
void my(char** p) { ++p; }
int main()
{
    char* s = (char*)malloc(10);
    strcpy(s, "BUDVA");
    my(&s); my(&s); my(&s);
    printf("%s", s);
    return (0);
}
```

(a)	(b)	(c)	(d)	(e)
BUDVA	UDVA	DVA	VA	A

3. What is the correct output of the following C code?

```
#include <stdio.h>
int main()
{
    const char s1[] = "Informatics";
    const char* s2 = "Elektrijada";
    printf("%u", sizeof(s1)+sizeof(s2));
    return (0);
}
```

(a)	(b)	(c)	(d)	(e)
8	16	22	24	26

4. What is the correct output of the following C code?

```
#include <stdio.h>
int main()
{
    int array[2][2] = {0, 1, 3, 6};
    int i, sum = 0;
    for (i=0; i<4; ++i)
    {
        int x, y;
        x = i % 2; if (x) y=0; else y=1;
        sum += *array[x,y];
    }
    printf("%d", sum);
}
```

(a)	(b)	(c)	(d)	(e)
12	10	8	6	4