

ELEKTRIJADA 2013
Siofok (Hungary), May 23-28, 2013
INFORMATICS
Tasks

1 Find the output of the following program:

```
#include <stdio.h>
#define S(x) sizeof(x)
typedef unsigned char UC;
UC fltfr(float fl)
{
    UC fr=(UC)fl, i=0;
    for (fl-=(UC)fl; i<S(fr)*4; i++, fl-=(UC)fl)
        fr = fr << 1 | (UC)(fl*=2);
    return (fr);
}
float frtfl(UC fr)
{
    float fl = fr >> S(fr)*4;
    UC i, m=1;
    for ( i=1; i<S(fr)*4; i++, m<=1, m|=1);
    fr &= m;
    fl += (float)fr / (1<<S(fr)*4);
    return (fl);
}
int main()
{
    UC i=2, j=1, sfr=0;
    float sfl=0;
    for ( ; j<11; j+=9)
    {
        for ( ; i<10*j; i*=2)
        {
            sfl += frtfl(i);
            sfr += fltfr(frtfl(i));
        }
        printf("%d %5.3f\n", sfr, sfl);
    }
    return (0);
}
```

2 Find the output of the following program:

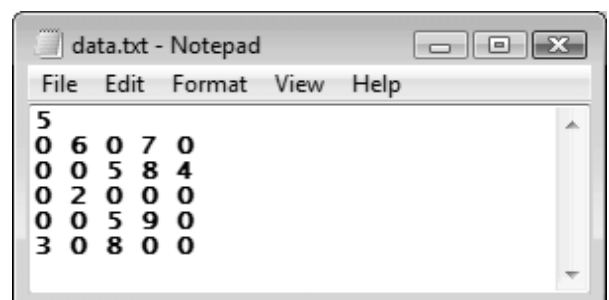
```
#include <stdio.h>
int x;
int *fop(int b[][3])
{
    ++b;
    b[!x][!x] = b[x][x];
    printf("%d\n", b[!x][!x]);
    return ((int*)b);
}
int fos(int *p)
{
    int s=0;
    while (*p++) s+=*p;
    return (s);
}
int main()
{
    int a[3][3] = {{8,7,6},{5,4,3},{2,1,0}};
    printf("%d", fos(fop(a)));
    return (0);
}
```

3 Find the output of the following program:

```
#include <stdio.h>
int main()
{
    int a1[5] = { 1, 2, 3, 4, 5 };
    int *p1 = (int*)&a1+1;
    int a2[4][3] = {1,2,3,4,5,6,7,8,9};
    int (*p2)[3] = a2;
    printf("%d %d\n", *(a1+1), *(p1-1));
    printf("%d %d\n", (*p2)[2],(*p2)[1]);
    ++p2;
    printf("%d %d", (*p2)[1],(*p2)[2]);
    return (0);
}
```

4 Find the output of the following program
(file **data.txt** is depicted bellow the code):

```
#include <stdio.h>
typedef struct { int u,v,w; } E;
E es[1024];
int n, e, d[32];
void fbf(int s)
{
    int i, j;
    for (i=0; i<n-1; ++i)
        for (j=0; j<e; ++j)
            if (d[es[j].u]+es[j].w>d[es[j].v])
                d[es[j].v]=d[es[j].u]+es[j].w;
}
int main(int argc, char *argv[])
{
    int i, j, w;
    FILE *fin = fopen("data.txt", "r");
    fscanf(fin, "%d", &n);
    for (i=0; i<n; ++i)
        for (j=0; j<n; ++j)
        {
            fscanf(fin, "%d", &w);
            if (w)
            {
                es[e].u=i; es[e].v=j; es[e].w=w; ++e;
            }
        }
    fclose(fin);
    fbf(0);
    for (i=0; i<n; ++i) printf("%d\n", d[i]);
    return (0);
}
```



5 Find the output of the following program:

```

#include <stdio.h>
#include <stdlib.h>
typedef struct N
{ int d,r,c,s; struct N *p[4]; } NOD;
typedef struct L { NOD *top; int c,s; } LAT;
NOD nN(int x, int s)
{
    int i; NOD n; n.d=0; n.r=x; n.c=0; n.s=s;
    for (i=0; i<4; n.p[i++]=0);
    return (n);
}
void uN(NOD *n, int x) { n->d=x; n->c++; }
NOD *fN(NOD *n, int x)
{
    NOD *pn=0; int i;
    if (x<n->r || n->r+n->s<x) pn=0;
    else if (!n->p[0]) pn=n;
    else
        for (i=0; !pn && i<4; i++)
            pn=fN(n->p[i],x);
    return (pn);
}
void sN(NOD *n)
{
    NOD *pn; int i, x;
    for (i=0; i<4; i++)
    {
        x=i*(n->s)/2;
        n->p[i] = (NOD *) malloc(sizeof(NOD));
        *(n->p[i]) = nN(n->r+x,(n->s)/2);
    }
    pn=fN(n,n->d); n->c--; uN(pn,n->d);
}
void tN(NOD *n, int top)
{
    if (!n->p[0] && n->c>0)
        printf("%d\n", n->d);
    else if (n->p[0])
    {
        int i, x=(top&1)?-1:1, t=top++;
        for(i=0; i<4; i++,t+=x) tN(n->p[t&3],top);
    }
}
void gL(LAT *n, int x)
{
    if (!n->top)
    {
        n->top = (NOD *) malloc(sizeof(NOD));
        *(n->top) = nN(0,n->s);
        uN(n->top,x); n->c++;
    }
    else
    {
        NOD *pn=fN(n->top,x);
        while (pn->c) { sN(pn); pn=fN(pn,x); }
        uN(pn,x); n->c++;
    }
}
void tL(LAT *n, int top) { tN(n->top,++top); }
int main()
{
    int i, x[] = {1,12,11,6,10,5,14,9};
    LAT l1 = {0,0,16};
    for (i=0; i<5; i++) gL(&l1,x[i]);
    tL(&l1,0);
    return (0);
}

```

6 Find the output of the following program
(suppose that `sizeof(char *)` returns 4):

```

#include <stdio.h>
char *f(char **p)
{
    char *t = (p += sizeof(p))[-1];
    return (t);
}
int main()
{
    char *t;
    char *s1[]={"ab","cd","ef","gh","ij"};
    char *s2[]={"ba","dc","fe","hg","ji"};
    char *s3[]={"aba","cdc","efe","ghg","iji"};
    t = f((s1,s2)),f((s2,s3));
    printf("%s", t);
    return (0);
}

```

7 Find the output of the following program:

```

#include <stdio.h>
#define M 7
#define X 999
int x;
int als(int *s)
{
    int i;
    x++;
    for (i=0; i<M; i++)
        if (!s[i]) return (s[i]);
    return (X);
}
void sp(int c[][M], int *p, int *d)
{
    int s[M]={0};
    int t=0, i, k, dc, sd, nd;
    for (i=0; i<M; i++) d[i]=X;
    s[t]=1; d[0]=0; t=0;
    while (!als(s))
    {
        sd=X; dc=d[t];
        for (i=0; i<M; i++)
        {
            if (!s[i])
            {
                nd=dc+c[t][i];
                if (nd<d[i]) { d[i]=nd; p[i]=t; }
                if (d[i]<sd) { sd=d[i]; k=i; }
            }
        }
        s[t=k]=1;
    }
}
int main()
{
    int c[M][M] = {{X,3,4,7,X,5,X},
                   {3,X,X,6,3,X,8},
                   {4,X,X,X,X,6,X},
                   {7,6,X,X,X,1,6},
                   {X,3,X,X,X,X,7},
                   {5,X,6,1,X,X,6},
                   {X,8,X,6,7,6,X}};
    int i, p[M]={0}, d[M];
    sp(c,p,d);
    printf("%d\n%d", x, d[M-1]);
    return (0);
}

```

8 Find the output of the following program:

```

#include <stdio.h>
#include <math.h>
void frs(char *a)
{
    char ar[10], af[10];
    char top, p, q, exp, k, i, y, j, n;
    struct { char info, next; } node[100];
    for (n=i=0; a[i]; ++n,++i)
    {
        node[i].info=a[i];
        node[i].next=i+1;
    }
    node[--n].next=-1;
    top=0;
    for (k=1; k<=2; k++)
    {
        for (i=0; i<10; i++)
            af[i]=ar[i]=-1;
        while (top!=-1)
        {
            p=top;
            top=node[top].next;
            y=node[p].info;
            for (exp=j=1; j<k; exp*=10,j++);
            j = (y/exp)%10;
            q = ar[j];
            if(q == -1)
                af[j] = p;
            else
                node[q].next = p;
            ar[j] = p;
        }
        for (j=0; j<10 && af[j]==-1; j++);
        top = af[j];
        for ( ; j<=9; j=i)
        {
            for (i=j+1; i<10&&af[i]==-1; i++);
            if(i<=9)
            {
                p = i;
                node[ar[j]].next = af[i];
            }
        }
        node[ar[p]].next = -1;
    }
    for (j=0; j<=n; j++)
    {
        do
        {
            k = node[top].info;
            top = node[top].next;
        }
        while (k == node[top].info && top!=-1);
        printf("%c", k);
    }
}

int main()
{
    char *a = "SIOFOK";
    frs(a);
    return (0);
}

```

9 Find the output of the following program:

```

#include <stdio.h>
int main()
{
    signed char i=1, j=0;
    for ( ; i && i<=100; i*=10, j++);
    printf("%d\n%d", i, j);

    for (i=100; j++<=10; )
        printf("\n%d", i+=i);

    return (0);
}

```

10 Find the output of the following program:

```

#include <stdio.h>
int f(int n)
{
    static int x;
    x+=n;
    if (n>0) { f(--n); f(--n); }
    return (x);
}

int main()
{
    printf("%d", f(4));
    return (0);
}

```

Appendix: ASCII table

	0	1	2	3	4	5	6	7
0	NUL	DLE	space	0	@	P	`	p
1	SOH	DC1 XON	!	1	A	Q	a	q
2	STX	DC2	"	2	B	R	b	r
3	ETX	DC3 XOFF	#	3	C	S	c	s
4	EOT	DC4	\$	4	D	T	d	t
5	ENQ	NAK	%	5	E	U	e	u
6	ACK	SYN	&	6	F	V	f	v
7	BEL	ETB	'	7	G	W	g	w
8	BS	CAN	(	8	H	X	h	x
9	HT	EM	)	9	I	Y	i	y
A	LF	SUB	*	:	J	Z	j	z
B	VT	ESC	+	;	K	[	k	{
C	FF	FS	,	<	L	\	l	|
D	CR	GS	-	=	M	]	m	}
E	SO	RS	.	>	N	^	n	~
F	SI	US	/	?	O	_	o	del