

ELEKTRIJADA 2011

Kopaonik (Serbia), May 20-25, 2011

INFORMATICS

Tasks

1 Find the output of the following program:

```
#include <stdio.h>
#define M 5

int bk=3, bv, bb=5, n, i;
int v[M] = {1,2,3,4};
int b[M][M] = {{1},{1,2},{1,2,3},{1,2,3,4}};

void f(int k, int brb)
{
    int i=0;
    if (k<bk)
    {
        for (i=0; i<v[k]; i++)
            if (brb>=b[k][i])
                f(k+1,brb-b[k][i]);
    }
    else
        if (brb==0) ++n;
}

int main()
{
    f(bv,bb); printf("%d\n", n);
    f(bv,bb); printf("%d", n);
    return (0);
}
```

2 Find the output of the following program:

```
#include <stdio.h>
#define M 5

int bk=3, bv, bb=5, n, i;
int v[M] = {1,2,3,4};
int b[M][M] = {{1},{1,2},{1,2,3},{1,2,3,4}};

void f(int k, int brb)
{
    static int i;
    if (k<bk)
    {
        for (i=0; i<v[k]; i++)
            if (brb>=b[k][i])
                f(k+1,brb-b[k][i]);
    }
    else
        if (brb==0) ++n;
}

int main()
{
    f(bv,bb); printf("%d\n", n);
    f(bv,bb); printf("%d", n);
    return (0);
}
```

3 Find the output of the following program:

```
#include <stdio.h>
#define pchar(char) *(char)
typedef char* pchar;

char b, c, n=010;

void g(pchar p)
{
    int b=0;
    while (pchar(p+b))
        printf("%0X ", pchar(p+b++));
    printf("\n");
}

void f(pchar p)
{
    while (n++<030)
        if ((n&0x3)==((n&0x30)>>4))
        {
            pchar(p+b++)=n;
            g(p);
        }
}

int main()
{
    static char a[5];
    f(a);
    return (0);
}
```

4 Find the output of the following program:

```
#include <stdio.h>

int f[10];
char s[]="INFO", t[]="ABCD";

int fn(int n)
{ return (n ? n*fn(n-1) : 1); }
void c(char *s, char *d)
{ while (*d++=*s++); }
int fl(char *s)
{ return (*s ? 1+fl(s+1) : 0); }
void ft(char *s)
{ while (*s) { *s=*(s+1); s++; } }

int main()
{
    int i, j, ti, tj, n=fl(s);
    int p[5]={12,23,24};
    for (i=0; p[i]; i++)
    {
        for (ti=p[i], tj=fn(j=n); j; tj/=j--)
        {
            f[j]=ti/tj; ti%=tj;
        }
        for (c(s,t), j=n-1; j>=0; ft(&t[f[j--]]))
            printf("%c", t[f[j]]);
        printf("\n");
    }
    return (0);
}
```

5 Find the output of the following program:

```
#include <stdio.h>

int fk(int n)
{
    int i=1; for (;++i*i<=n); return (--i);
}

int fp(int n)
{
    int p1=fk(n), p2=0;
    while (p1+p2<n)
    {
        if ((p1*p1-p2*p2)>n) p2++;
        else if ((p1*p1-p2*p2)==n) return (!p2);
        else p1++;
    }
    return (1);
}

int main()
{
    int n=1, bp=0;
    for (; n<10; n+=2) bp+=fp(n);
    printf("%d\n", bp);
    for (; n<20; n+=2) bp+=fp(n);
    printf("%d\n", bp);
    for (; n<30; n+=2) bp+=fp(n);
    printf("%d\n", bp);
    return (0);
}
```

6 Find the output of the following program:

```
#include <stdio.h>

char s[]="Kopaonik";
char *func() { return s; }

union DATA { unsigned char data;
               int d:5;
               unsigned char m:4; } x;

int main(int argc, char **argv)
{
    printf("%s\n",__func__);
    x.data = 021; printf("%d\n", x.d>>x.m );
    x.data = 077; printf("%d", x.d>>x.m );
    return (0);
}
```

7 Find the output of the following program:

```
#include <stdio.h>

int a=1, b=2;
#define M(a,b) a ## b(a)
#define a t(f1,t(f1,f2(b)))
#define b(x) t(f2,t(f2,f1(a)))
#define ab(x) a+b(b)

typedef int (*i2i)(int);
int f1(int x) { return (++x); }
int f2(int x) { return (--x); }
int t(i2i f,int x) {return(f(f(x)));}

int main()
{
    printf("%d\n%d", M(a,b), ab(5));
    return (0);
}
```

8 Find the output of the following program:

```
#include <stdio.h>
#include <stdlib.h>

typedef struct X {int a,b,c; struct X *p;} M;
M *kor = NULL;

int f(int a, int b)
{
    M *c = kor;
    while (c)
    {
        if (c->a == a && c->b == b) return 1;
        c = c->p;
        if (c == kor) break;
    }
    return (0);
}

void add(int a, int b)
{
    M *c, *t;
    if (f(a,b))
    {
        c = kor;
        while (c)
        {
            if (c->a==a && c->b==b) break;
            c = c->p;
        }
        c->c++;
    }
    else
    {
        t = (M*)malloc(sizeof(M));
        t->a = a; t->b = b; t->c = 1;
        t->p = (kor==NULL)? t : kor->p;
        kor = (kor==NULL)? t : kor;
        kor->p = t;
    }
}

int ff(int n)
{
    int x0=0, y0=1, x1=1, y1=n, a, b, br=0;
    do
    {
        a = (y0+n)/y1*x1-x0;
        b = (y0+n)/y1*y1-y0;
        add(a,b);
        x0=x1; x1=a; y0=y1; y1=b;
        br++;
    }
    while (x0<y0);
    return (br);
}

int main()
{
    int a, b, ma, mb, m=1;
    for (a=1; a<10; ff(a++));
    ma=a=kor->a; mb=b=kor->b;
    while (kor)
    {
        kor = kor->p;
        if (kor->c > m)
        { ma=kor->a; mb=kor->b; m=kor->c; }
        if (kor->a==a && kor->b==b) break;
    }
    printf("%d\n%d\n%d", ma, mb, m);
    return (0);
}
```