

ELEKTRIJADA 2005

Kopaonik, May 12-17, 2005.

INFORMATICS

ELEKTRIJADA 2005

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1 What's the output of the next program?

```
#include <stdio.h>
int f(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;
        x0=x1; x1=a; y0=y1; y1=b; br++;
    }
    while (x0<y0);
    return (br);
}
main()
{
    printf("%d %d",f(5),f(20));
}
```

Answer:

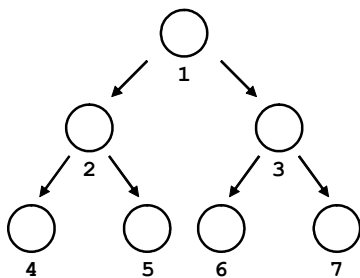
2 What's the output of the next program?
(Suppose that Floating Point data is presented by usually used FP standard IEEE 754)

```
#include <stdio.h>
union unija { float f; double d; } u;
main()
{
    extern unija u;
    u.d=1;
    printf("%4.2f %4.2f", u.d, u.f);
}
```

Answer:

3 Look at the binary tree shown on the picture below with the node weights as depicted. Put the letters of the word "BEOGRAD" (one letter in one node) and then compute total weight of all vocals in the tree in case of:

- a) postorder traversal,
- b) preorder traversal,
- c) inorder traversal.



Answer:

a)	b)	c)

4 How many bytes in memory we need to store the binary tree (from the previous task) in a computer where data bus is 16-bit wide and address bus is 20-bit wide, if each tree node is presented by the next structure?

```
struct node
{ char let;
  struct node *ln, *rn; }
```

Answer:

5 What's the output of the next program?

```
#include <stdio.h>
main()
{
    unsigned char p1=0125, p2=025, p3;
    p1&=~(0xF*0x10);
    p2|=p1/4; p3=~(~p1|~p2);
    printf("%o %o %o",p1,(p1^p2)>>5,p3);
}
```

Answer:

6 What's the output of the next program?

```
#include <stdio.h>
#define N 5
int ops[N],s[N],ae[N],be[N];
void next (int n, int lim, int *opt,
           int sa, int sb, int i)
{
    auto int j;
    if (i<n) {
        if (sb-be[i]>*opt)
            next(n,lim,opt,sa,sb-be[i],i+1);
        if (sa+ae[i]<lim) {
            s[i]=1;
            next(n,lim,opt,sa+ae[i],sb,i+1);
            s[i]=0;
        }
    }
    else if (sb>*opt)
        for(*opt=sb,j=0; j<n; ops[j]=s[j],j++);
}
void najsel(int n, int lim, int *opt)
{
    int i,j,k,sb,sa;
    for (i=sb=0; i<n; sb+=be[i], i++);
    sa=*opt=0;
    next(n,lim,opt,sa,sb,0);
}
main() {
    int opt,i;
    for (i=0; i<N; i++) ae[i]=N-(be[i]=i);
    najsel(N,N,&opt); printf("%d ",opt);
    najsel(N,2*N,&opt);printf("%d",opt);
}
```

Answer:

7 What's the output of the next program?

```
#include <stdio.h>
#define T(x,y) { x+=y; y=x-y; x-=y; }
char p[]={0167, 044,0135,0155,056,
          0153,0173, 045,0177,0157};

void ps(int b, int r)
{
    int c;
    c=p[b]>> (r%2 ? r/2*3:3+(r-3)*4/r);
    if (r%2)
        printf(" %c ", c&1 ? '-' : ' ');
    else
        printf("%c %c", c&1 ? '|':' ',
                (c>>1)&1 ? '|':' ');
    printf(" ");
}

void f()
{
    int i,j,r,k,uc,ruc,c[2]={3};
    char a,b;
    for (i=0; i<10; i++)
    {
        for (j=i+1,r=i,ruc=0; j<10; j++)
        {
            for (a=p[r],b=p[j],uc=0,k=8;k-->0)
            {
                uc+=(a&1)==(b&1)?0:c[a&1]+c[b&1];
                a>>=1; b>>=1;
            }
            if (uc>ruc) { ruc=uc; r=j; }
        }
        if (r-i) T(p[i],p[r])
    }
}

main()
{
    int r;
    for (f(), r=1; r<=5; ps(0,r),r++)
        printf("\n");
}
```

Answer:

8 What's the output of the next program?

```
#include <stdio.h>
char f1 (char *d)
{ return(--(*d));}
char p1 (void *a)
{ return (f1((char*)a)); }
main()
{
    char c='C', *b=&c;
    int i=8, *k=&i;
    printf("%c %d",p1(b),p1(k));
    i=512; printf(" %d",p1(k));
}
```

Answer:

9 What's the output of the next program?

```
#include <stdio.h>
int kdn(int a,int b)
{
    int k=0,t,s=1;
    while (!(a%2)+(b%2))
    { k++; a/=2; b/=2; }
    t = a%2 ? -b : a;
    while (t)
    {
        while (!(t%2)) t/=2;
        if (t>0) a=t; else b=-t;
        t=a-b;
    }
    for ( ; k ; s*=2,k-- );
    return (a*s);
}

int f(int n,int a)
{
    int k;
    k=kdn((n-1)*a, (n+1)*a);
    for (;n;n--)
        k=kdn(k,kdn((n-1)*a, (n+1)*a));
    return (k);
}

main()
{
    printf("%d", f(10,9));
}
```

Answer:

10 What's the output of the next program?

```
#include <stdio.h>
#include <stdlib.h>
#define M 6
main()
{ int **c;
  int i, j, k, m;
  c = (int **) calloc(M,sizeof(int *));
  for (i=0; i<M; i++)
  { *(c+i)=(int *) calloc(2*M,sizeof(int));
    for (j=0; j<M-i-1; j++)
      *(*c+i+j)=0;
    for (k=1; k<=i+1; k++)
      *(*c+i+j++)=(i*10+k)%10;
    for (m=k-2; m; m--)
      *(*c+i+j++)=(i*10+m)%10; }
  for (i=1 ; i<4 ; i++)
  {
    for (j=3; j<5+i; j++)
    {
      k=*(c+i-1+j);
      printf("%c", k ? k+'0' : ' ');
    }
    printf("\n"); }
}
```

Answer: