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/*
```

```
A program to solve the boundary value differential equation using shooting method.
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This program is created by Mohammad Sazzad Hossain.
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*/
```

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

```
#include <math.h>
```

```
#define NMAX 101
```

```
#define g1(y1,y2,t) (y2)
```

```
#define g2(y1,y2,t) (-pi*pi*(y1+1)/4)
```

```
double pi;
```

```
main()
```

```
{
```

```
int i,n;
```

```
double dl=1e-6;
```

```
double dk11,dk21,dk12,dk22,dk13,dk23,dk14,dk24;
```

```
double x,x1,xu,dx,h,yl,yu,x0,x1,x2,d,y1,y2,f0,f1;
```

```
double y[2][NMAX];
```

```
extern double pi;
```

```
n = NMAX;
```

```
d = 0.1;
```

```
pi = 4*atan(1);
```

```
x1 = 0;
```

```
xu = 1;
```

```
h = (xu-x1)/(n-1);
```

```
yl = 0;
```

```
yu = 1;
```

```
x0 = (yu-yl)/(xu-x1);
```

```
dx = 0.01;
```

```
x1 = x0+dx;
```

```
y[0][0] = yl;
```

```
while (fabs(d) > dl)
```

```
{
```

```
    y[1][0] = x0;
```

```
for (i = 0; i < n-1; ++i)
```

```
{
```

```

x = x1+h*(i+1);
y1 = y[0][i];
y2 = y[1][i];
dk11 = h*g1(y1,y2,x);
dk21 = h*g2(y1,y2,x);
dk12 = h*g1((y1+dk11/2),(y2+dk21/2),(x+h/2));
dk22 = h*g2((y1+dk11/2),(y2+dk21/2),(x+h/2));
dk13 = h*g1((y1+dk12/2),(y2+dk22/2),(x+h/2));
dk23 = h*g2((y1+dk12/2),(y2+dk22/2),(x+h/2));
dk14 = h*g1((y1+dk13),(y2+dk23),(x+h));
dk24 = h*g2((y1+dk13),(y2+dk23),(x+h));
y[0][i+1] = y[0][i]+(dk11+2*(dk12+dk13)+dk14)/6;
y[1][i+1] = y[1][i]+(dk21+2*(dk22+dk23)+dk24)/6;
}
f0 = y[0][n-1]-1;

```

```

y[1][0] = x1;
for (i = 0; i < n-1; ++i)
{
x = x1+h*(i+1);
y1 = y[0][i];
y2 = y[1][i];
dk11 = h*g1(y1,y2,x);
dk21 = h*g2(y1,y2,x);
dk12 = h*g1((y1+dk11/2),(y2+dk21/2),(x+h/2));
dk22 = h*g2((y1+dk11/2),(y2+dk21/2),(x+h/2));
dk13 = h*g1((y1+dk12/2),(y2+dk22/2),(x+h/2));
dk23 = h*g2((y1+dk12/2),(y2+dk22/2),(x+h/2));
dk14 = h*g1((y1+dk13),(y2+dk23),(x+h));
dk24 = h*g2((y1+dk13),(y2+dk23),(x+h));
y[0][i+1] = y[0][i]+(dk11+2*(dk12+dk13)+dk14)/6;
y[1][i+1] = y[1][i]+(dk21+2*(dk22+dk23)+dk24)/6;
}
f1 = y[0][n-1]-1;
d = f1-f0;
x2 = x1-f1*(x1-x0)/d;
x0 = x1;
x1 = x2;
}
for (i = 0; i < n; ++i)
{
x = h*i;

```

```
printf("%16.8lf %16.8lf\n", x,y[0][i]);  
}  
}
```