PRÁCTICA DE MÉTODOS DE CÁLCULO NUMÉRICOS

REALIZADA POR:

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Fichero principal (p2.m)

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clear all

disp(' ')
disp('Practica 2 de Metodos de Calculo Numerico')
disp(' ')
disp('Problema termico')
disp(' ')
N = input('Introduce el numero de puntos: ')
h = 1/(N+1)
puntos = [0:h:1];
g = input('Introduce el flujo de calor en 0: ')
beta = input('Introduce la temperatura en 1: ')
disp('Introduce la funcion a(x)=lx^2+kx+g')
la = input('Introduce el valor de l: ')
ka = input('Introduce el valor de k: ')
ga = input('Introduce el valor de g: ')
a = la*puntos.^2+ka*puntos+ga;
disp(' ')
disp('Introduce la funcion f(x)=lx^2+kx+g')
lf = input('Introduce el valor de l: ')
kf = input('Introduce el valor de k: ')
gf = input('Introduce el valor de g: ')
f = lf*puntos.^2+kf*puntos+gf;

%Superdiagonal de Ah
Ah1 = zeros(N+1,1);
%Diagonal de Ah
Ah2 = zeros(N+2,1);
%Subdiagonal de Ah
Ah3 = zeros(N+1,1);

bh = zeros(N+2,1);

for i=0:N
        %Metodo de trapecio
        Ahk=(1/(2*(puntos(i+2)-puntos(i+1))))*((a(i+1)*[1 -1;-1 1])+(a(i+2)*[1 -1;-1 1]));
        %Metodo de trapecio
        bhk=((puntos(i+2)-puntos(i+1))/2)*[f(i+1) f(i+2)];

        %Ensamblado de Ah
        Ah1(i+1)=Ahk(1,2);
        Ah2(i+1)=Ah2(i+1)+Ahk(1,1);
        Ah2(i+2)=Ahk(2,2);
        Ah3(i+1)=Ahk(2,1);

        %Ensamblado de bh
        bh(i+1)= bh(i+1)+bhk(1);
        bh(i+2)=bhk(2);
end
```

```
%Bloqueo en 1
Ah2(N+2)=10^30;
bh(N+2)=beta*(10^30);

%Condicion inicial en 0
bh(1)=bh(1)+g;

%Factorizacion LU tridiagonal
alfas = zeros(N+2,1);
betas = zeros(N+1,1);
as = Ah2;
bs = Ah3;
cs = Ah1;
y = zeros(N+2,1);
Uh = zeros(N+2,1);

alfas(1)=Ah2(1);

for i=2:N+2
        betas(i-1) = (bs(i-1))/(alfas(i-1));
        alfas(i) = as(i)-betas(i-1)*cs(i-1);
end

y(1) = bh(1);

for i=2:N+2
        y(i) = bh(i)-betas(i-1)*y(i-1);
end

Uh(N+2)=(y(N+2))/(alfas(N+2));

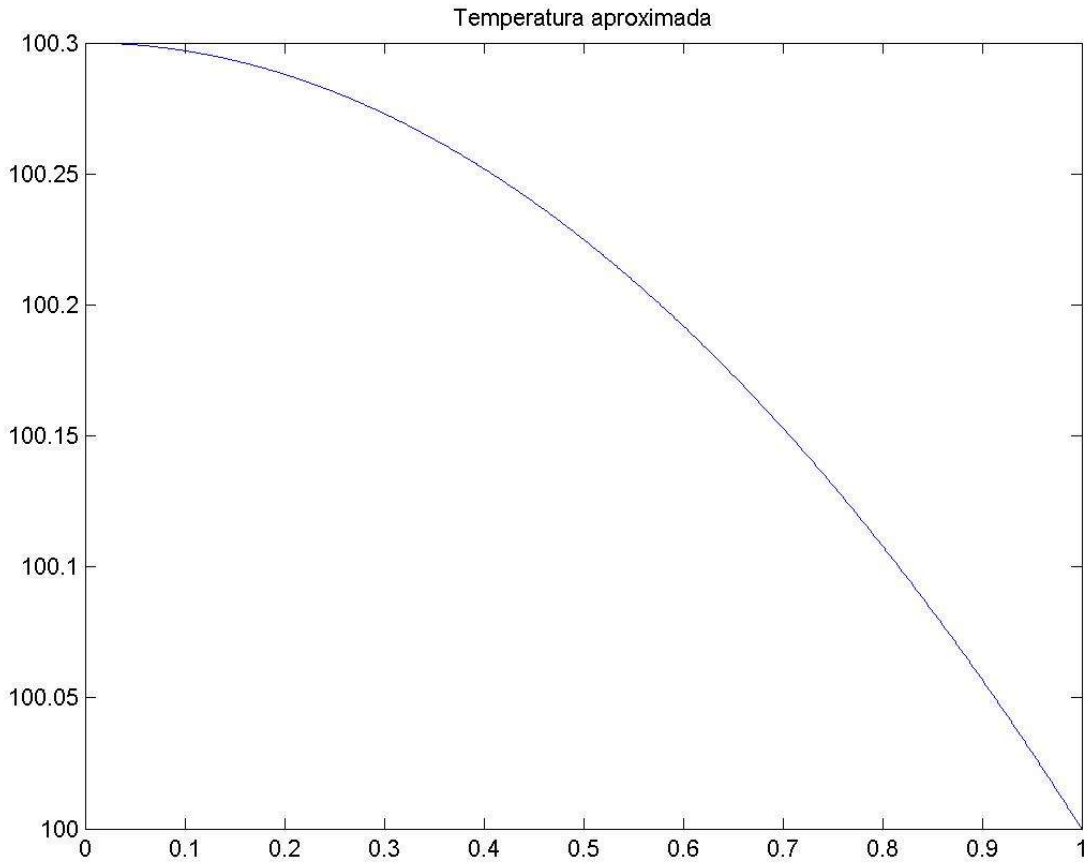
for i=N+2:-1:2
        Uh(i-1)=(y(i-1)-cs(i-1)*Uh(i))/alfas(i-1);
end

figure;
plot(puntos,Uh);
title('Temperatura aproximada');
```

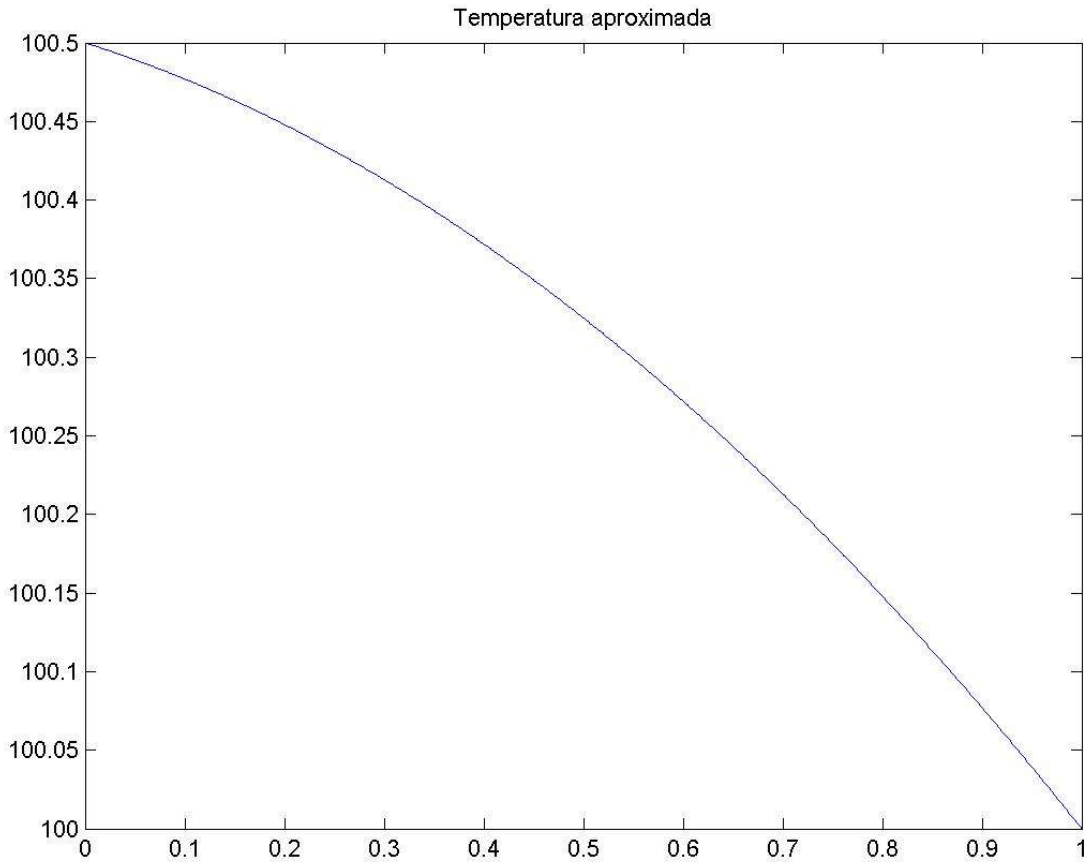
CASOS DE PRUEBA

En todos los casos el número de puntos es N=1000.

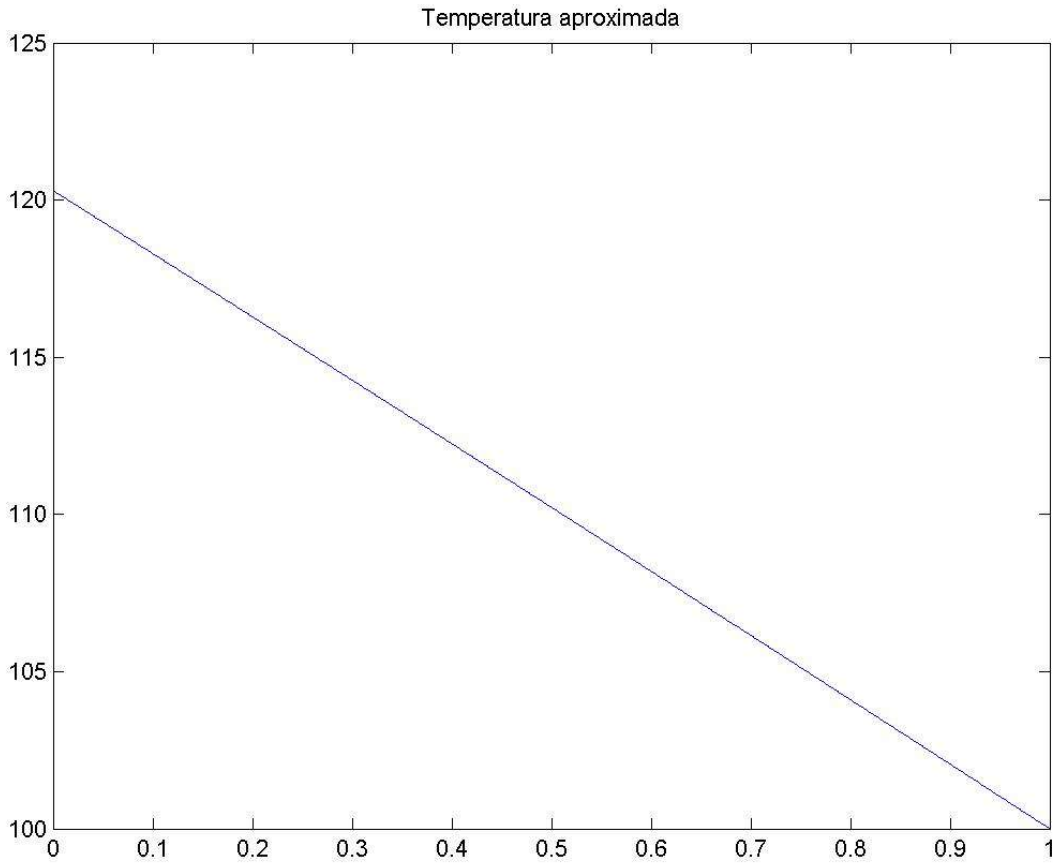
1.a(x)=5, f(x)=3,g=0,u(1)=100



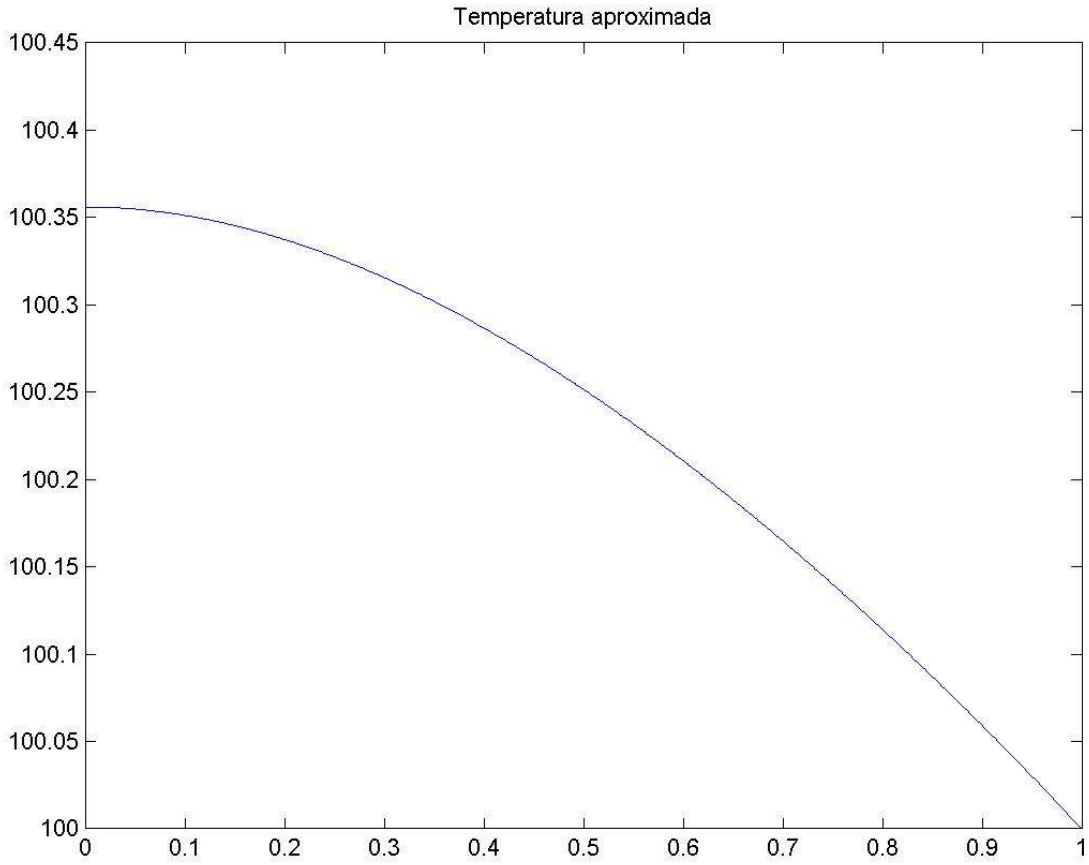
2.a(x)=5, f(x)=3,g=1,u(1)=100



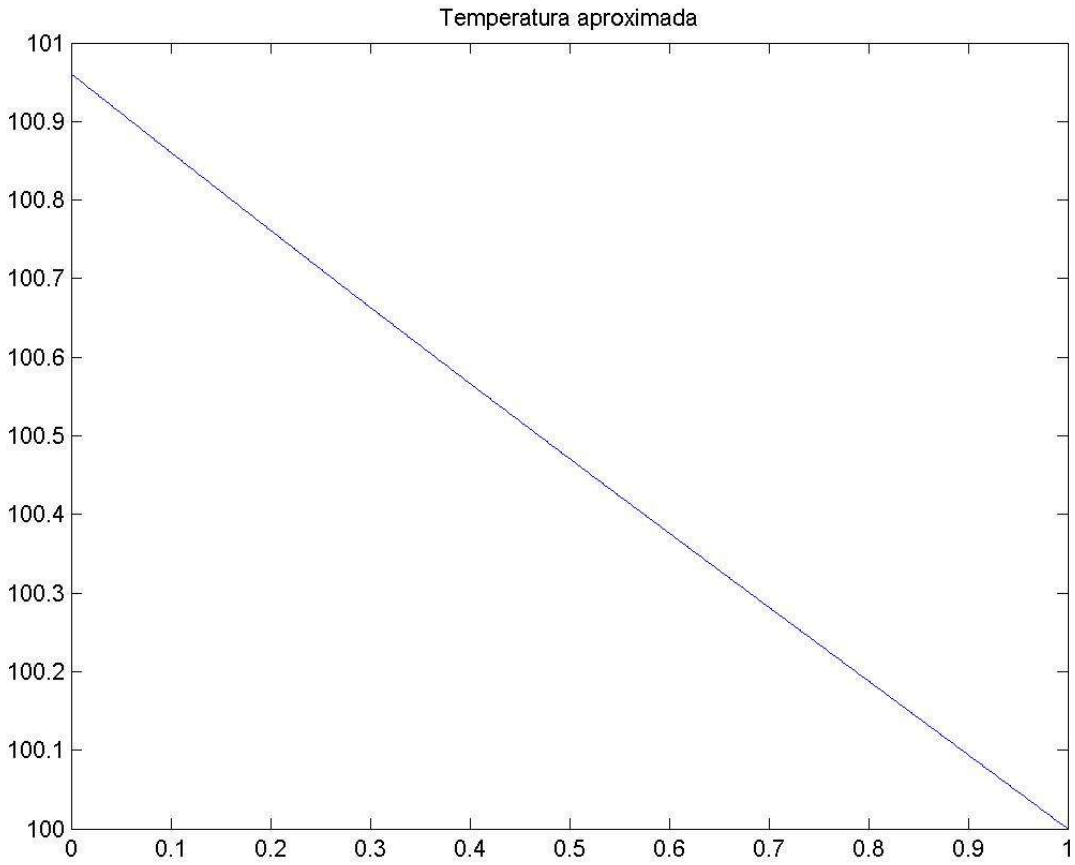
3.a(x)=5, f(x)=3,g=100,u(1)=100



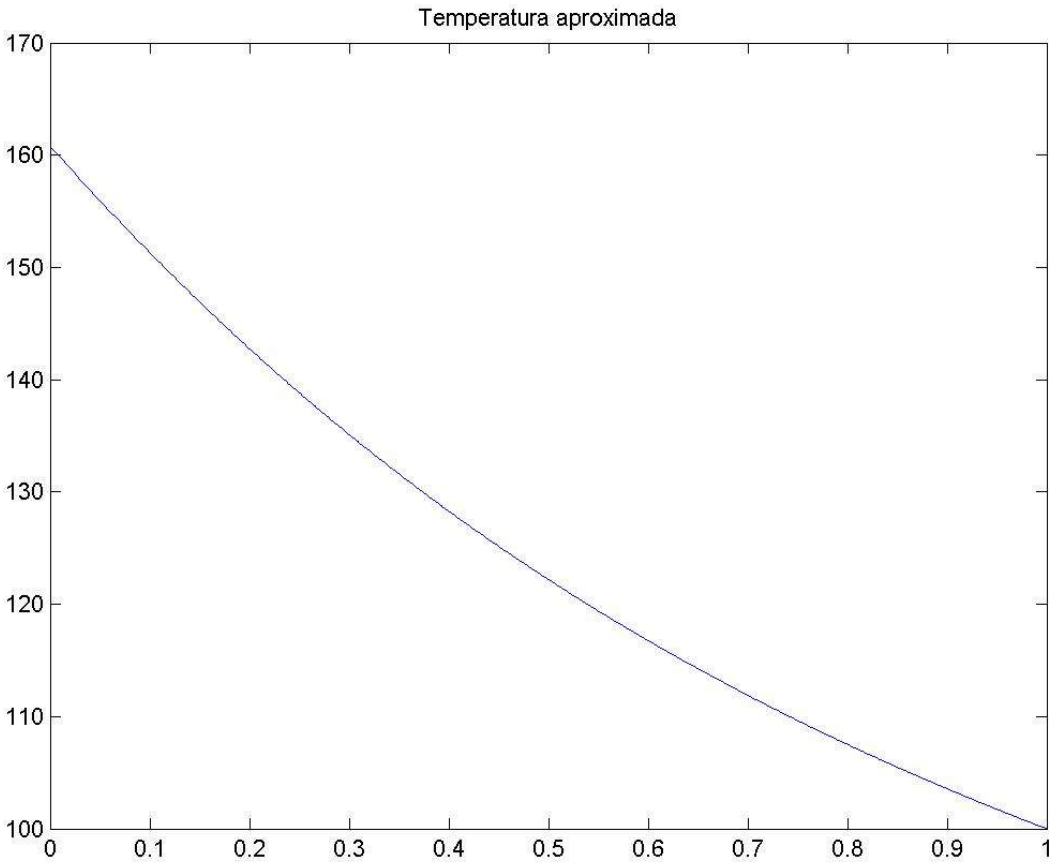
4.a(x)=x^2+x+1,f(x)=x^2+x+1,g=0,u(1)=100



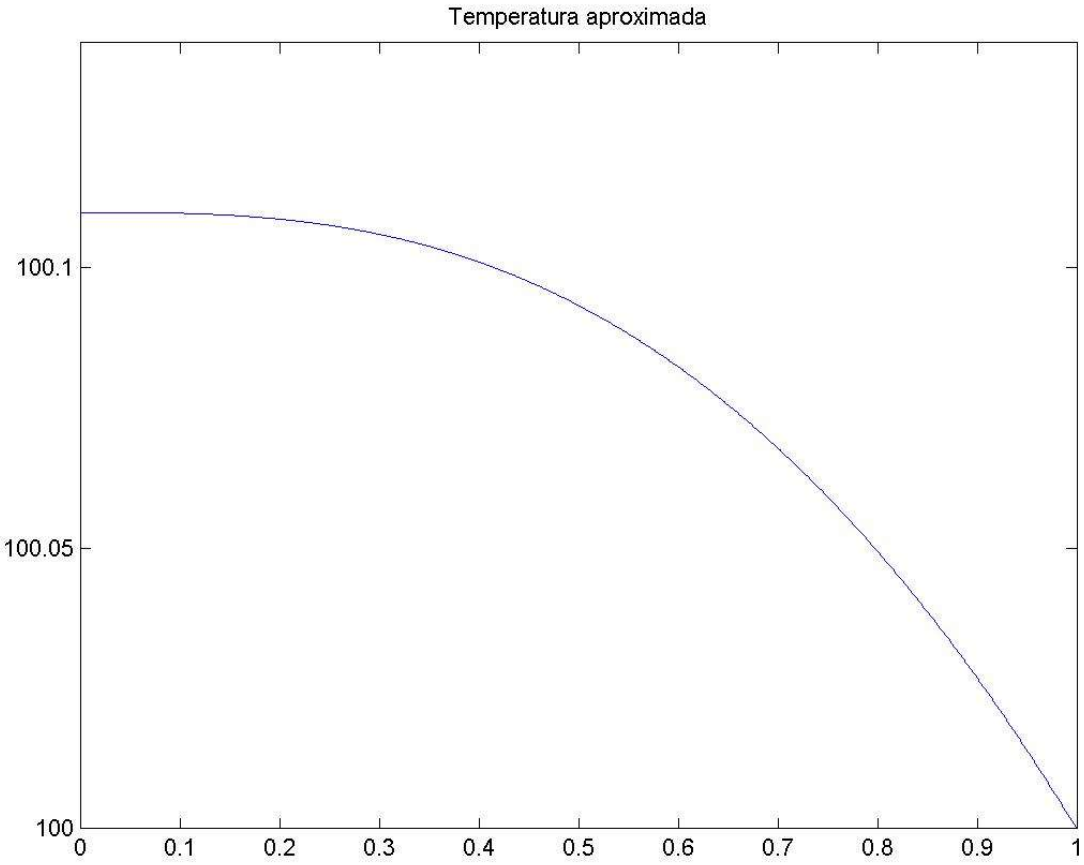
5.a(x)=x^2+x+1,f(x)=x^2+x+1,g=1,u(1)=100



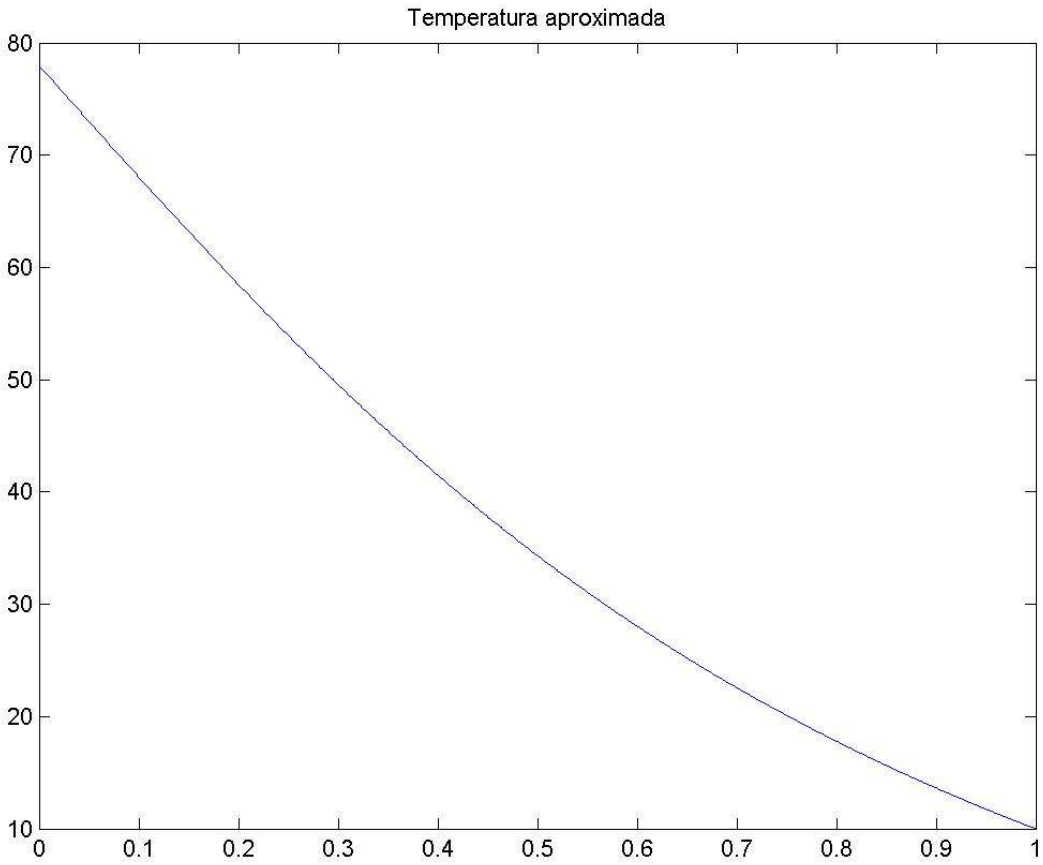
6.a(x)=x^2+x+1,f(x)=x^2+x+1,g=100,u(1)=100



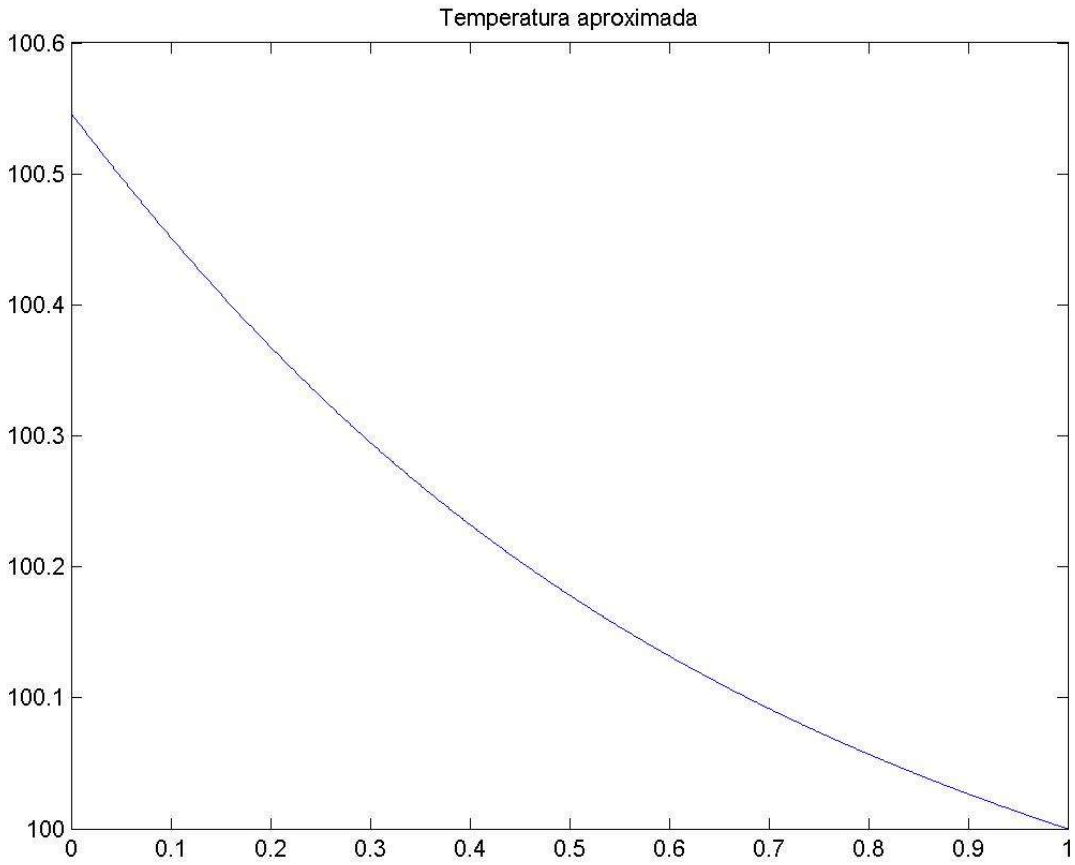
7.a(x)=x^2+2x+1,f(x)=2x^2+x,g=0,u(1)=100



8.a(x)=2x^2+1,f(x)=2x+1,g=100,u(1)=10



9.a(x)=2x^2+x+1,f(x)=0,g=1,u(1)=100



10.a(x)=2x^2+x+1,f(x)=0,g=10,u(1)=100