

Euler Method via m-files

Matlab Code in eulerc1.m for

$$y' = c(y_{\text{sur}} - y) \text{ and } y(0) = 200$$

```
clear;
y(1) = 200.;
yexact(1) = 200;
T = 50;
KK = 4
h = T/KK;
t(1)= 0.;
for k = 1:KK
    t(k+1) = t(k) + h;
    yexact(k+1) = 70 + 130*
        exp(-.05*t(k+1));
    y(k+1) = y(k) + h*
        (.05*(70 - y(k)));
end
error = abs(yexact(KK+1) - y(KK+1))
plot(t,y,'b',t,yexact,'r')
```

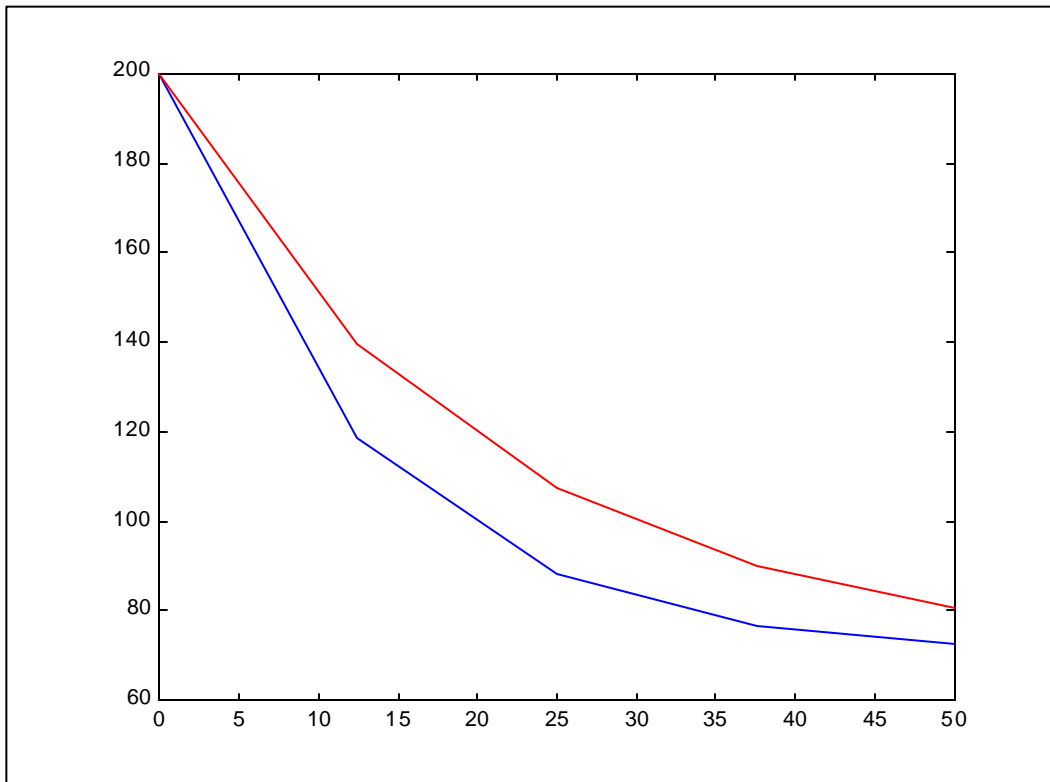
EDU» eulercl

KK =

4

error =

8.1002



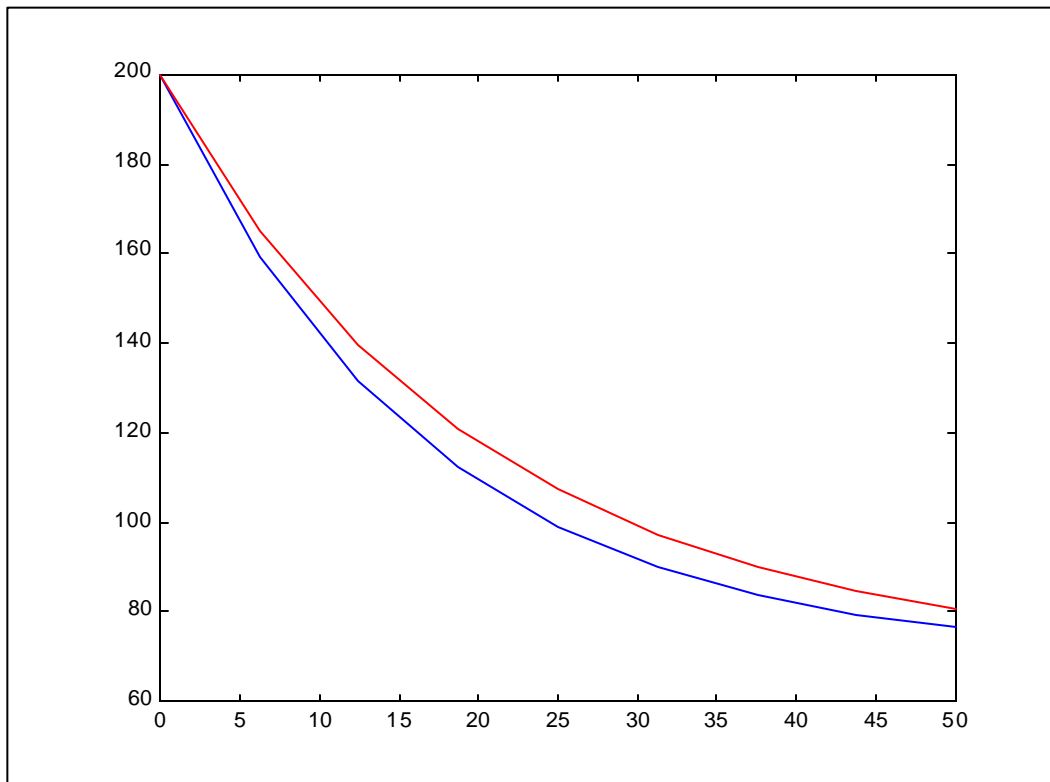
EDU» eulerc1

KK =

8

error =

4.1828



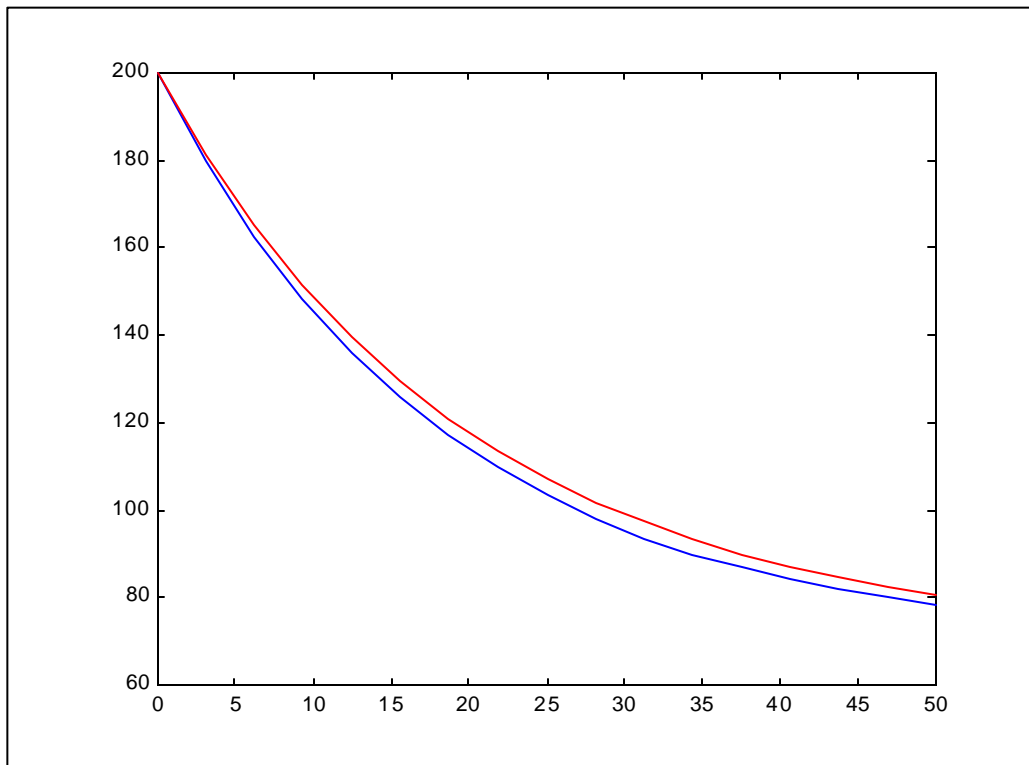
EDU» eulercl

KK =

16

error =

2.0935



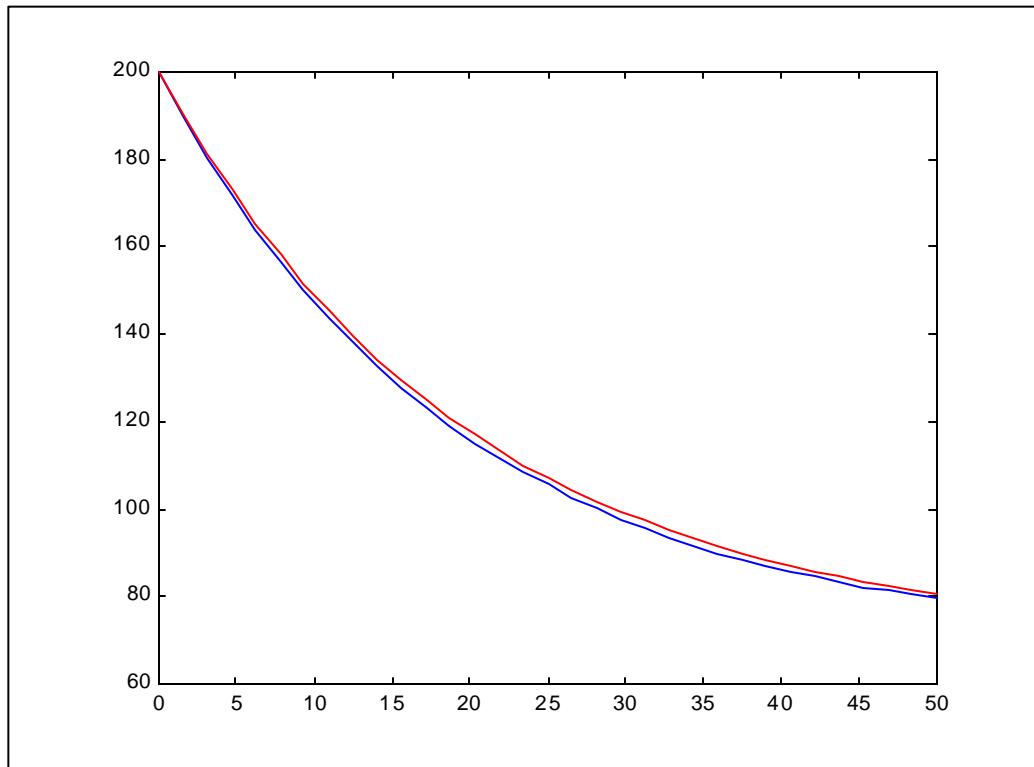
EDU» eulercl

KK =

32

error =

1.0450



Matlab code in euler2.m for
 $y' = t y^{1/2}$ and $y(0) = 4$

```
clear;
y(1) = 4.;
yexact(1) = 4;
T = 2;
KK = 32
h = T/KK;
t(1)= 0.;
for k = 1:KK
    t(k+1) = t(k) + h;
    yexact(k+1) = (.25*t(k+1)^2
                    + 2)^2.;
    y(k+1) = y(k) + h*(t(k)*y(k)^.5);
end
error = abs(yexact(KK+1) - y(KK+1))
plot(t,y,'b',t,yexact,'r')
```

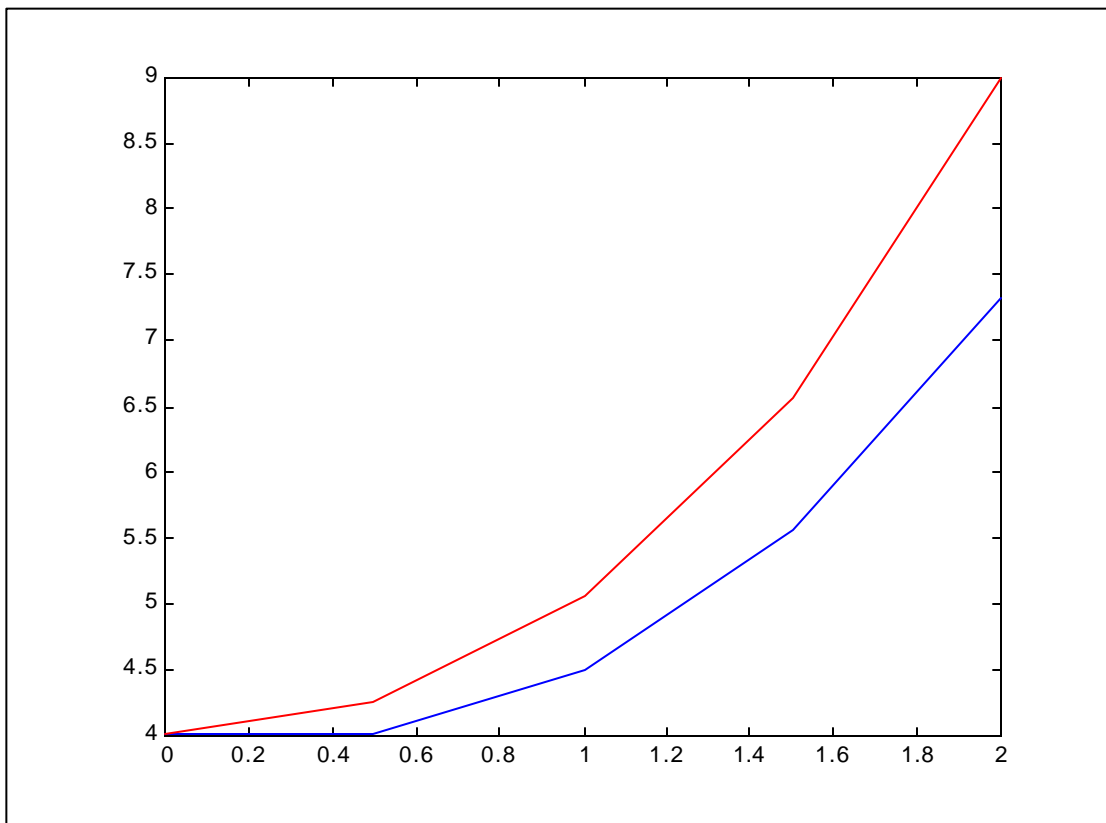
eulerc2

KK =

4

error =

1.6708



EDU» eulerc2

KK =

32

error =

0.2323

