

# Integriranje II

## 12. VAJA

## 12.1 Integriranje po Rombergovi metodi

Izračunaj določeni integral po Rombergovi metodi na 5 mest natančno. Rezultat preveri z Matlab orodji za integriranje.

$$I = \int_{-1}^1 \cos(x^2) e^x dx$$

Rombergova formula:

$$R_{i,j} = \frac{4^{j-1} R_{i,j-1} - R_{i-1,j-1}}{4^{j-1} - 1}, (j = 2, \dots, i), (i = 2, \dots, k)$$

Prve vrednosti  $R_{i,1}$  izračunamo po Trapezni metodi.

# 12.1 Integriranje po Rombergovi metodi

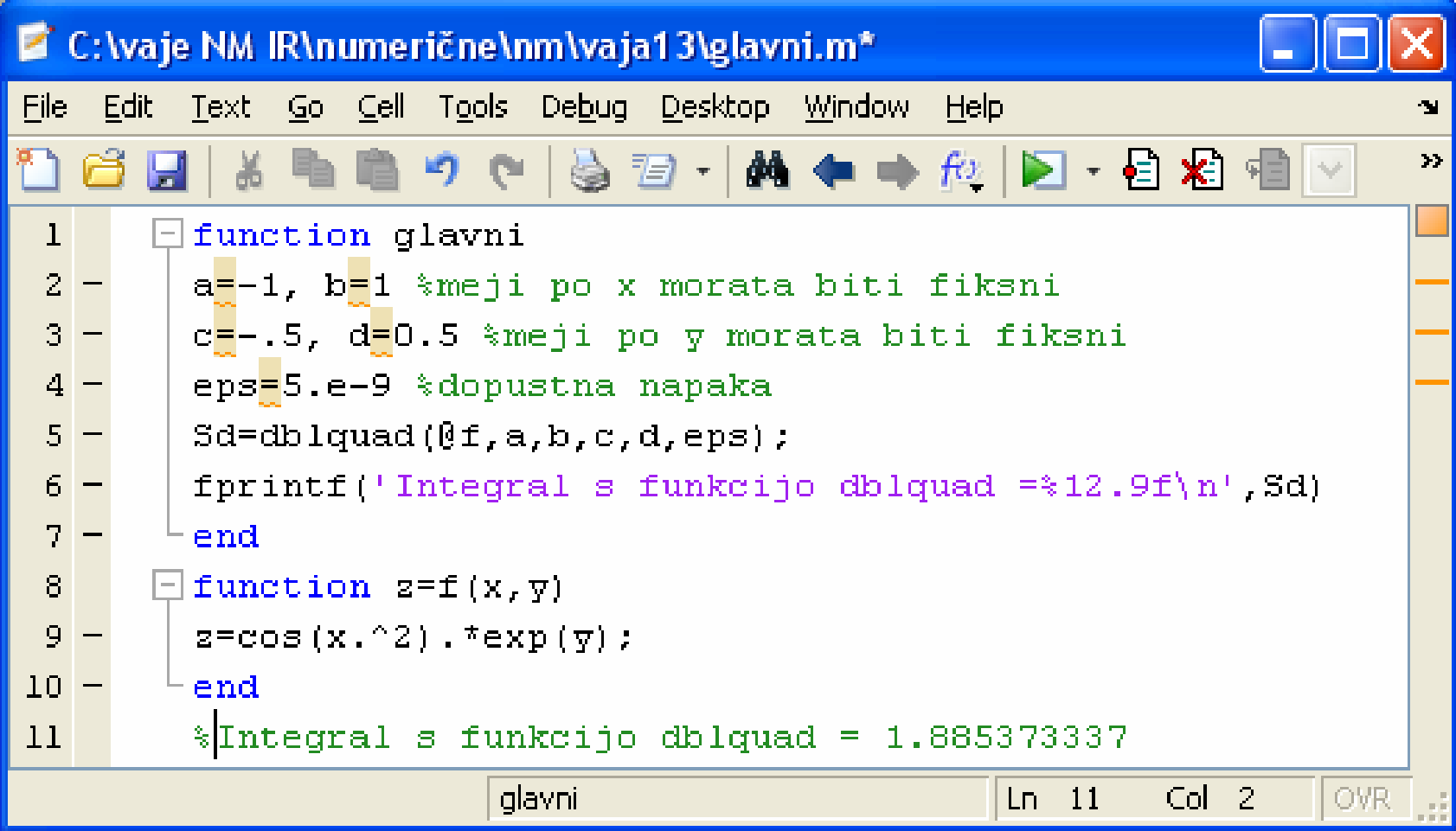
```
Editor - C:\WAJENM~1\NUMERI~1\nm\vaja13\Na14a.m
File Edit Text Desktop Window Help
[Icons]
1 %Rombergova metoda
2 clc; clear all;
3 f=inline('cos(x.^2).*exp(x)','x');
4 a=-1;b=1;n=2;
5 x=linspace(a,b,n);
6 y=f(x);
7 eps=10e-6;
8 h=(b-a)/(n-1);
9 %Začnemo s Trapezno metodo
10 R(1,1)=trapz(x,y);
11 for i=2:100
12     n=2*n-1;
13     x=linspace(a,b,n);
14     y=f(x);
15     R(i,1)=trapz(x,y);
16     for j=2:i
17         R(i,j)=(4^(j-1)*R(i,j-1)-R(i-1,j-1))/(4^(j-1)-1);
18     end
19     if abs(R(i,i)-R(i-1,i-1))<eps; break; end
20 end
21 format long
22 R %izpis
23 fprintf('Vrednost integrala po Rombergovi metodi %15.10f\n',R(i,i));
24 fprintf('Vrednost integrala (quad) %15.10f\n',quad(f,a,b,eps));
25 %Test
26 %Vrednost integrala      2.0872255905
27 %Vrednost integrala (quad)  2.0872288223
script Ln 27 Col 43 OVR
```

## 12.2 Dvojni integral

Izračunaj določeni dvojni integral z matlab funkcijo `dblquad(@f,a,b,c,d,eps)`;

$$I = \int_{-1}^1 \int_{-0.5}^{0.5} \cos(x^2)e^y dx dy$$

## 12.2 Dvojni integral



The screenshot shows a MATLAB script window titled "C:\vaje NM IR\numerične\nm\vaja13\glavni.m\*". The script defines a function "glavni" and a sub-function "z=f(x,y)". The "glavni" function sets parameters for a double integral: a=-1, b=1 (x limits), c=-0.5, d=0.5 (y limits), and eps=5.e-9 (tolerance). It uses the "dblquad" function to calculate the integral of "z" over the specified region. The result is printed as "Integral s funkcijo dblquad = 1.885373337".

```
1 function glavni
2 - a=-1, b=1 %meji po x morata biti fiksni
3 - c=-.5, d=0.5 %meji po y morata biti fiksni
4 - eps=5.e-9 %dopustna napaka
5 - Sd=dblquad(@f,a,b,c,d,eps);
6 - fprintf('Integral s funkcijo dblquad =%12.9f\n',Sd)
7 - end
8 function z=f(x,y)
9 - z=cos(x.^2).*exp(y);
10 - end
11 %Integral s funkcijo dblquad = 1.885373337
```

$$I = \int_{-1}^1 \int_{-0.5}^{0.5} \cos(x^2) e^y dx dy$$

## 12.3 Integriral

Izračunaj določeni integral z matlabovo funkcijo trapz in quad na 5 mest natančno.

$$I = \int_1^2 \ln(x) dx$$

# 12.3 Integral

```
Editor - C:\WAJENM~1\NUMERI~1\nm\vaja13\Nal3a.m
File Edit Text Desktop Window Help
[Icons] [Icons] [Icons] [Icons] [Icons] [Icons] [Icons] [Icons] [Icons] [Icons]
1  %Trapezna metoda
2  clc; clear all;
3  f=inline('log(x)','x');
4  a=1;b=2;n=2;
5  x=linspace(a,b,n);
6  y=f(x);
7  eps=10e-6;
8  h=(b-a)/(n-1);
9  TS=trapz(x,y);
10 for i=1:100
11     n=2*n-1;
12     h=(b-a)/(n-1);
13     x=linspace(a,b,n);y=f(x);
14     TN=trapz(x,y); %Matlabova funkcija
15     if abs((TN-TS)/3)<eps, break, end;
16     TS=TN;
17 end
18 %ispis
19 fprintf('Vrednost integrala po trapezni metodi %15.10f\n',TN);
20 fprintf('Vrednost integrala oi Simpsonu je %15.10f\n',quad(f,a,b,eps));
21 %Test
22 %Vrednost integrala po trapezni metodi      0.3862918180
23 %Vrednost integrala oi Simpsonu je      0.3862943343|
script Ln 23 Col 51 OVR
```