Definite Integrals and its applications

AIM

- To evaluate the definite integrals, Riemann sums and compares it.
- To find the area of the regions enclosed by curves and visualize it.

MATLAB Syntax used

`int(f,v)`	uses the symbolic object v as the variable of integration, rather than the variable determined by symvar
`rsums(f, [a, b])`	rsums(f, a, b) and rsums(f, [a, b]) approximates the integral for x from a to b.
`fill(X,Y,C)`	fill(X,Y,C) creates filled polygons from the data in X and Y with vertex color specified by C.
`char(X)`	converts array X of nonnegative integer codes into a character array.

```
clc
clear all
syms x
f=input('enter the function f(x):');
a=input('enter lower limit of x ');
b=input('enter the upper limit of x');
n=input('number of intervals');
z=int(f,a,b)
```

```
value = 0;
dx = (b-a)/n;
for k=1:n
c = a+k*dx;
d=subs(f,x,c);
value = value + d;
end
value = dx*value
ezplot(f,[a b])
z=int(f,a,b)
rsums(f, a, b)
```

Example

1) Evaluate $f(x) = \sin(x), 0 < x < 2\pi$

MATLAB Code

```
clc
clear all
syms x y
y1=input('ENTER THE Y1 REGION VALUE');
y2=input('ENTER THE Y2 REGION VALUE');
fg=figure;
ax=axes;
ez1=ezplot(char(y1));
hold on
ez2=ezplot(char(y2));
hold on
```

```
t=solve(y1-y2); %(Y1-Y2=0)
f=int(y1-y2,t(1),t(2))
kokler=double(t)
x1 = linspace(kokler(1),kokler(2));
yy1 =subs(y1,x,x1);
yy2 = subs(y2,x,x1);
x1 = [x1,x1];
yy = [yy1,yy2];
fill(x1,yy,'g')
grid on
f=int(y1-y2,t(1),t(2))
```

Example

2) Find the area of the regions enclosed by the curves $y = x^2 - 2x, y = x$

Practice Problems

1) Find the area of the regions enclosed by the curves $y = -x^2 + 4x, y = x^2$

2) Find the area of the regions enclosed by the curves $y = 7 - 2x^2, y = x^2 + 4$