

Лабораторная работа № 5

```
> restart;
```

```
> with(VectorCalculus):
```

```
> with(plots):
```

1

```
> Int(1/sqrt(x), x=0..2)=int(1/sqrt(x), x=0..2);
```

$$\int_0^2 \frac{1}{\sqrt{x}} dx = 2\sqrt{2}$$

(1)

```
> Int(1/x, x=0..2)=int(1/x, x=0..2);
```

$$\int_0^2 \frac{1}{x} dx = \infty$$

(2)

2

```
> Int(1/sqrt(x), x=1..+infinity)=int(1/sqrt(x), x=1..+infinity);
```

$$\int_1^{\infty} \frac{1}{\sqrt{x}} dx = \infty$$

(3)

```
> Int(1/x^2, x=2..+infinity)=int(1/x^2, x=2..+infinity);
```

$$\int_2^{\infty} \frac{1}{x^2} dx = \frac{1}{2}$$

(4)

```
> Int(1/sqrt(x), x=0..+infinity)=int(1/sqrt(x), x=0..+infinity);
```

$$\int_0^{\infty} \frac{1}{\sqrt{x}} dx = \infty$$

(5)

```
> Int(1/(x^2+1), x=-infinity..+infinity)=int(1/(x^2+1), x=-infinity..+infinity);
```

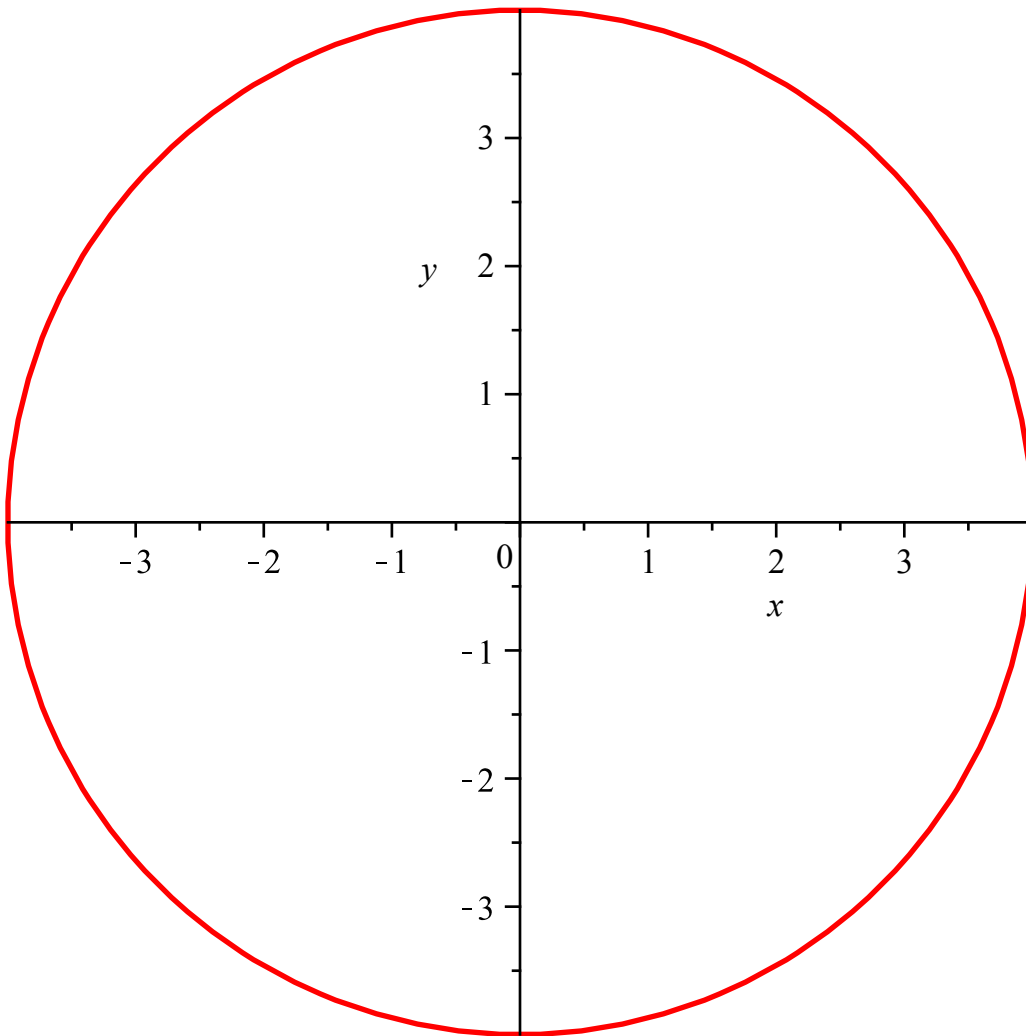
$$\int_{-\infty}^{\infty} \frac{1}{x^2+1} dx = \pi$$

(6)

()

4

```
> implicitplot(x^2+y^2=4^2,x=-4..4,y=-4..4,thickness=2);
```



```
> int(1,[x,y]=Circle(` $\langle$ , $\rangle$ `(0,0),4));
```

16π

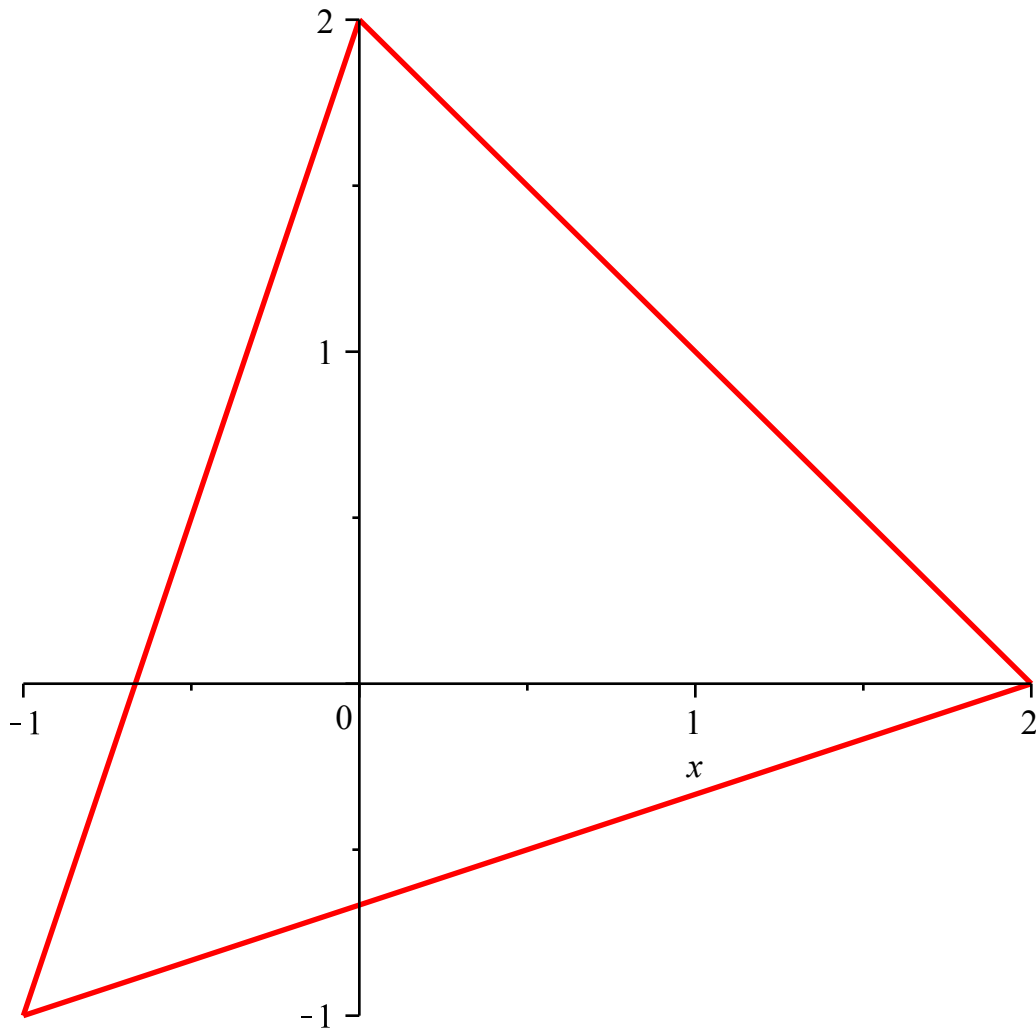
(7)

```
> int(1,[x,y]=Sector(Circle(` $\langle$ , $\rangle$ `(0,0),4),0,Pi/3));
```

$\frac{8}{3}\pi$

(8)

```
> g1:=plot(-x+2,x=0..2,thickness=2):  
g2:=plot(1/3*x-2/3,x=-1..2,thickness=2):  
g3:=plot(3*x+2,x=-1..0,thickness=2):  
display(g1,g2,g3);
```



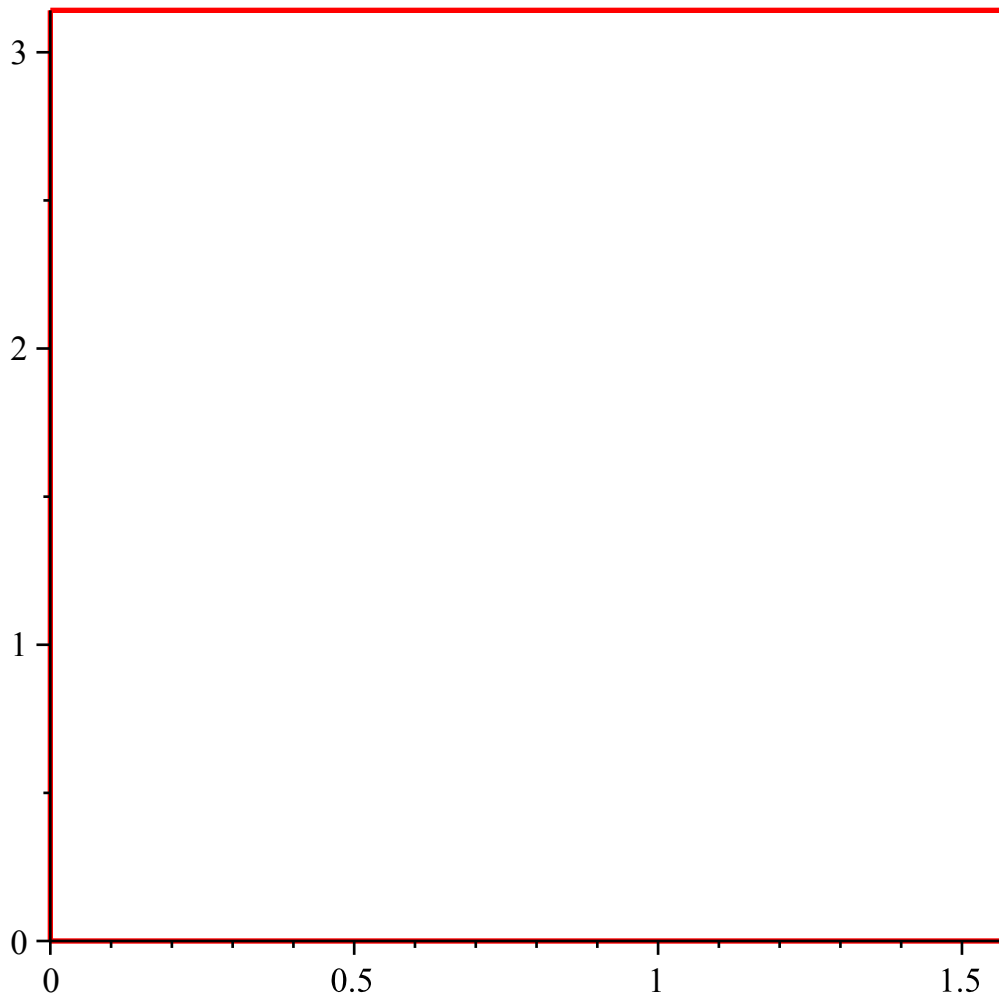
```
> int(1,[x,y]=Triangle(` $\langle, \rangle$ `(-1, -1), ` $\langle, \rangle$ `(2, 0), ` $\langle, \rangle$ `(0, 2)));
```

4

(9)

= 0, y = 0, x = Pi/2, y = Pi

```
> g1:=plot([0,t,t=0..Pi],thickness=2):
g2:=plot([Pi/2,t,t=0..Pi],thickness=2):
g3:=plot([t,0,t=0..Pi/2],thickness=2):
g4:=plot([t,Pi,t=0..Pi/2],thickness=2):
display(g1,g2,g3,g4);
```



```
> int(1, [x,y]=Rectangle(0..Pi/2,0..Pi));
```

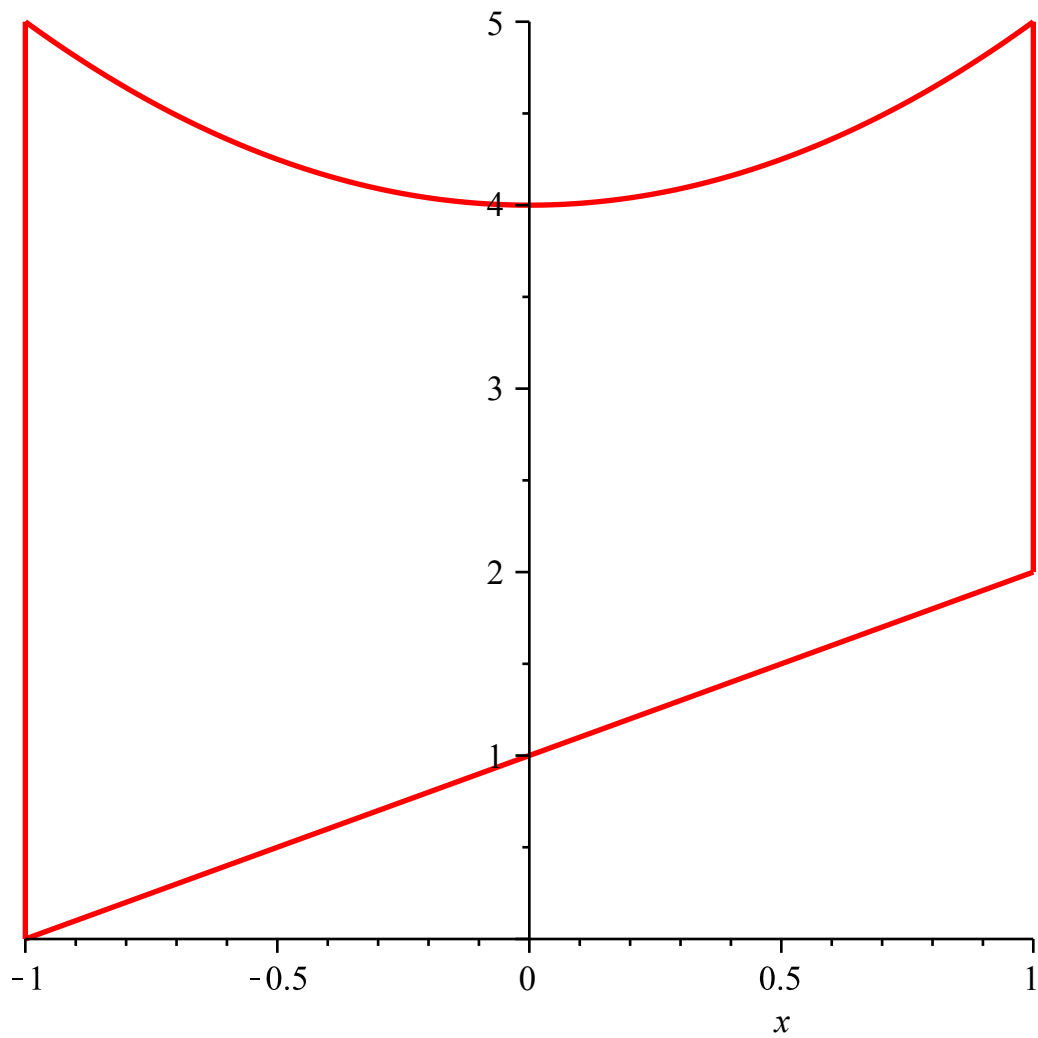
$$\frac{1}{2} \pi^2$$

(10)

```
, = - 1 , y = x + 1 , x =
```

$$1 \ y = x^2 + 4$$

```
> g1:=plot(x^2+4,x=-1..1,thickness=2):
g2:=plot(x+1,x=-1..1,thickness=2):
g3:=plot([-1,t,t=0..5],thickness=2):
g4:=plot([1,t,t=2..5],thickness=2):
display(g1,g2,g3,g4);
```



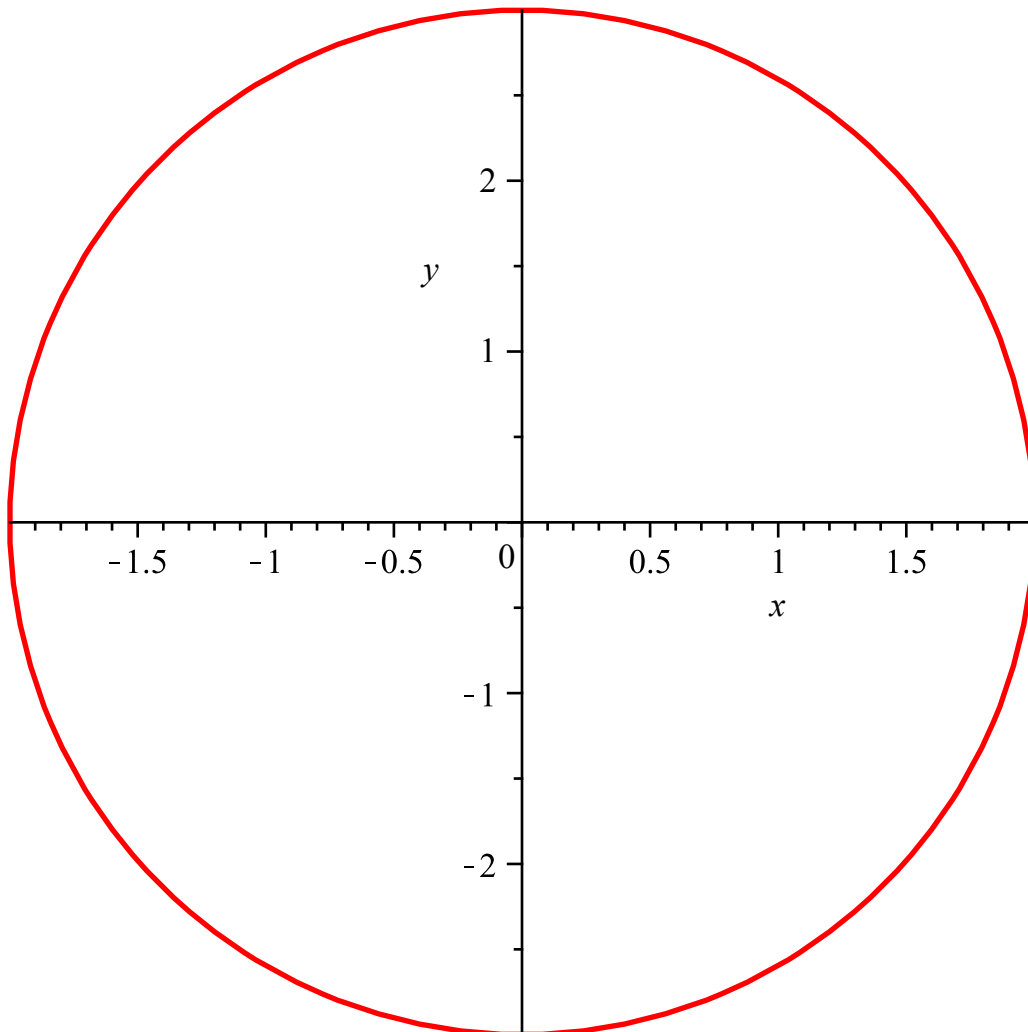
```
> int(1, [x,y]=Region(-1..1,x+1..x^2+4));
```

$\frac{20}{3}$

(11)

a = 2 , b = 3

```
> implicitplot(x^2/4+y^2/9=1,x=-2..2,y=-3..3,thickness=2);
```



```
> int(1, [x,y]=Ellipse(x^2/4+y^2/9-1));
```

$$6\pi \quad (12)$$

```
> int(x^2+y^2, [x,y]=Circle(`<`,>`(0, 0), r));
```

$$\frac{1}{2} \pi r^4 \quad (13)$$

```
> int(y^2, [x,y]=Sector(Circle(`<`,>`(0, 0), r), 0, Pi/3));
```

$$\frac{1}{4} \left(-\frac{1}{8} \sqrt{3} + \frac{1}{6} \pi \right) r^4 \quad (14)$$

```
> int(x*y, [x,y]=Triangle(`<`,>`(0, 0), `<`,>`(1, 0), `<`,>`(0, 1)));
```

$$\frac{1}{24} \quad (15)$$

```
> int(sin(x)/x, [x,y] = Rectangle(0..Pi/2, 0..Pi/2));
```

$$\frac{1}{2} \text{Si}\left(\frac{1}{2} \pi\right) \pi \quad (16)$$

$$\begin{aligned} &> \text{int}(x+y, [x,y]=\text{Region}(0..1,x^2..x)); \\ &\qquad\qquad\qquad \frac{3}{20} \end{aligned} \tag{17}$$

$$\begin{aligned} &> \text{int}(x, [x,y]=\text{Ellipse}(x^2/4+y^2/9-1)); \\ &\qquad\qquad\qquad 0 \end{aligned} \tag{18}$$

$$\begin{aligned} &> \text{int}(\exp(-x^2-y^2-z^2), [x,y,z]=\text{Sphere}(\langle, \rangle(0, 0, 0), r)); \\ &\qquad\qquad\qquad \pi(-2r + \sqrt{\pi} \operatorname{erf}(r) e^{r^2}) e^{-r^2} \end{aligned} \tag{19}$$

$$\begin{aligned} &> \text{int}(\sin(x) \cos(y) \tan(z), [x,y,z]=\text{Parallelepiped}(0..Pi, 0..Pi/2, 0..Pi/4)); \\ &\qquad\qquad\qquad \ln(2) \end{aligned} \tag{20}$$

$$\begin{aligned} &> \text{int}(x+y+z, [x,y,z]=\text{Tetrahedron}(\langle, \rangle(0, 0, 0), \langle, \rangle(1, 0, 0), \langle, \rangle(0, 1, 0), \langle, \rangle(0, 0, 1))); \\ &\qquad\qquad\qquad \frac{1}{8} \end{aligned} \tag{21}$$

$$\begin{aligned} &> \text{int}(x-y+2z, [x,y,z]=\text{Region}(0..1, -x..x^2, 0..x*y)); \\ &\qquad\qquad\qquad -\frac{67}{1512} \end{aligned} \tag{22}$$

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