

# Wichtige Flächenintegrale

Dokumentnummer: DX1203  
 Fachgebiet: Integralrechnung  
 Einsatz: 4HAK (drittes Lernjahr)



## 1 Fläche des Kreises

Figure 1:

Berechnung der Kreisfläche mittels Integral

```
(C1) 4*integrate((r^2-x^2)^(1/2),x,0,r);
```

```
--> 4*'integrate((r**2-x**2)**(1/2),x,0,r)=  
4*integrate((r**2-x**2)**(1/2),x,0,r);
```

Is r positive, negative, or zero? positive;

```
(%o10) 4 ∫0r √(r2-x2) dx = π r2
```

```
--> r:5;
```

```
(%o11) 5
```

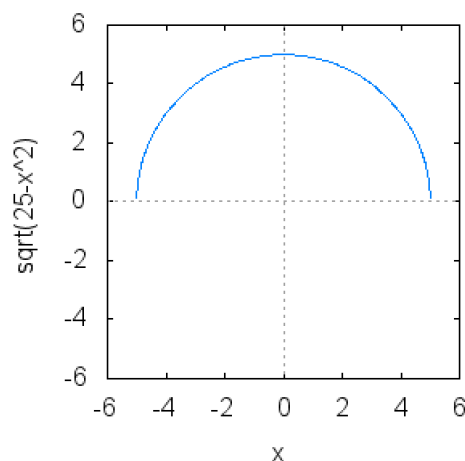
```
--> f(x):=sqrt(r**2-x**2);
```

```
(%o12) f(x):=√(r2-x2)
```

```
--> wxplot2d([f(x)], [x,-6,6], [y,-6,6],  
[gnuplot_preamble, "set size ratio 1; set zeroaxis;"])$
```

plot2d: expression evaluates to non-numeric value somewhere in plotting range

```
(%t13)
```



## 2 Fläche der Ellipse

Figure 2:

Berechnung der Ellipsenfläche

```
(C2) 4*b/a*integrate((a^2-x^2)^(1/2),x,0,a);
```

```
--> 4*b/a*'integrate((a**2-x**2)**(1/2),x,0,a)=
4*b/a*integrate((a**2-x**2)**(1/2),x,0,a);
```

$$(\%o14) \frac{12 \int_0^5 \sqrt{25-x^2} dx}{5} = 15 \pi$$

```
--> kill(all);
```

```
(%o0) done
```

```
--> g:x**2/a**2+y**2/b**2=1;
```

$$(\%o1) \frac{y^2}{b^2} + \frac{x^2}{a^2} = 1$$

```
--> l:solve(g,y);
```

$$(\%o2) [y = -\frac{b\sqrt{a^2-x^2}}{a}, y = \frac{b\sqrt{a^2-x^2}}{a}]$$

```
--> a:5;b:3;
```

```
(%o3) 5
```

```
(%o4) 3
```

```
--> f(x):=b/a*sqrt(a**2-x**2);
```

$$(\%o5) f(x) := \frac{b}{a} \sqrt{a^2 - x^2}$$

```
--> wxplot2d([f(x)], [x,-6,6], [y,-6,6],
[gnuplot_preamble, "set size ratio 1; set zeroaxis;"])$
```

plot2d: expression evaluates to non-numeric value somewhere in plotting range

