

Integralrechnung

Dokumentnummer: DX1020
 Fachgebiet: Infinitesimalrechnung

1 Unbestimmtes Integral

```
(%i1) kill(all);
(%o0) done
```



Figure 1:

$$\int x^2 dx = \frac{x^3}{3} + C$$

```
(%i1) 'integrate(x**2,x)=integrate(x**2,x)+"C";
(%o1)  $\int x^2 dx = \frac{x^3}{3} + C$ 
```

2 Bestimmtes Integral

```
(%i2) kill(all);
(%o0) done
```

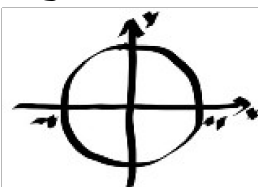
Figure 2:

$$\int_1^2 x^2 dx = \frac{x^3}{3} \Big|_1^2 = \frac{8}{3} - \frac{1}{3} = \frac{7}{3}$$

```
(%i1) 'integrate(x**2,x,1,2)=integrate(x**2,x,1,2);
(%o1)  $\int_1^2 x^2 dx = \frac{7}{3}$ 
```

3 Flächenintegral

Figure 3:



```
(%i2) kill(all);
(%o0) done
```

```
(%i1) assume(r>0);
(%o1) [r>0]
```

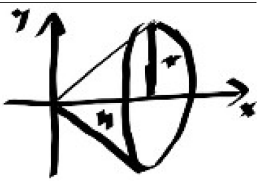
```
(%i2) a:-r;b:+r;
(%o2) -r
(%o3) r

(%i4) f(x):=sqrt(r**2-x**2) /* das ergibt sich aus dem Lehrsatz des Pythagor
(%o4) f(x):= $\sqrt{r^2-x^2}$ 

(%i5) Flaeche:2*'integrate(f(x),x,a,b)=2*integrate(f(x),x,a,b) /* Halbkreis
(%o5)  $2 \int_{-r}^r \sqrt{r^2-x^2} dx = \pi r^2$ 
```

□ 4 Volumsintegral

Figure 4:



```
(%i6) kill(all);
(%o0) done

(%i1) f(x):=r/h*x;a:0;b:h;
(%o1) f(x):= $\frac{r}{h}x$ 
(%o2) 0
(%o3) h

(%i4) %pi*'integrate((f(x))**2,x,a,b)=%pi*integrate((f(x))**2,x,a,b);
(%o4)  $\pi \int_0^h f(x)^2 dx = \frac{\pi h r^2}{3}$ 
```