

Computergestuetzte Mathematik zur Analysis

Lektion 3 (Integration und Differentiation)

▼ Summen und Reihen (Wdh.)

```
[> restart;  
[> sum(j,j=0..n);  
[> sum(1/j^4, j = 1 .. infinity);
```

▼ Grenzwerte / Limes

```
[> limit((1+z/n)^n,n=infinity);  
[> limit( (x^2+2*x-3)/(x-1),x=1);  
[> limit( sum(1/j,j=1..n)-ln(n),n=infinity);
```

▼ Integration und Differentiation

```
[> f := 1/(1+t^2);  
[> If := int(f, t);  
[> diff(If,t);  
[> int(f,t=a..b);  
[> ff:= x -> 1/(1+x^2);  
[> int(ff,x); # Ist das richtig ?  
[> int(ff(t),t);  
[> diff(ff,t);  
[> diff(ff(y),y);  
[> restart;  
[> f := exp(Pi*I*x);  
[> d2f := diff(diff(f,x),x);  
[> d2f := diff(f,x,x);  
[> x$4;  
[> d4f := diff(f,x$4);  
[> Diff(f,x$3);
```

Kettenregel:

```
[> f:='f':  
[> g:='g':  
[> diff(f(g(x)),x);
```

Produktregel:

```
[> diff(f(x)*g(x),x);
```

Quotientenregel:

```
LL> # ÜA :)
```

▼ Traege Operatoren

```
> S:= Sum(1/j^2,j=1..infinity);  
> value(S);  
> f:= sin(x)/x;  
> Df := Diff(f,x);  
> value(Df);  
> If := Int(f,x=-1..1);  
> If := value(If);  
> evalf(If);  
> Limit(Sum(1/j,j=1..n)-ln(n),n=infinity);  
> value(?);
```

▼ Differentiation II

```
> f := 1/(1+t^2);  
ff := t -> 1/(1+t^2);  
> value(Diff(ff(t),t));  
> diff(f,t);  
> unapply(value(Diff(ff(t),t)),t);  
D(ff); # :)  
> D(arctan); #Funktionsschreibweise  
> f:=exp@sin; #Verkettung  
> f(x);  
> g:=exp@exp@exp;  
> g(x);  
> expand(g(x));  
> G:=exp@@3;  
> G-g;  
> (D@@2)(f);  
> expand(?(x));  
> f:='f'; g:='g';  
> D(f@g);  
> expand(?(x));  
> D(f/g);  
> normal(?);
```