

Rechenregeln für Logarithmen

1 Produktregel

Figure 1: Logarithmus eines Produkts

x	y	x*y	log(x)	log(y)	log(x*y)	log(x)+log(y)
1	25	25	0	1,39794001	1,39794001	1,39794001
2	24	48	0,30103	1,38021124	1,68124124	1,68124124
3	16	48	0,47712125	1,20411998	1,68124124	1,68124124
4	12	48	0,60205999	1,07918125	1,68124124	1,68124124
5	3	15	0,69897	0,47712125	1,17609126	1,17609126

```
(%i16) x:[1,2,3,4,5];
      y:[25,24,16,12,3];
(%o16) [1,2,3,4,5]
(%o17) [25,24,16,12,3]
```

```
(%i18) x*y;
(%o18) [25,48,48,48,15]
```

```
(%i19) A:map(log,x),numer;
      B:map(log,y),numer;
(%o19) [0,0.69314718055995,1.09861228866811,1.386294361119891,
1.6094379124341]
(%o20) [3.218875824868201,3.178053830347946,2.772588722239781,
2.484906649788,1.09861228866811]
```

```
(%i21) C:map(log,x*y),numer;
(%o21) [3.218875824868201,3.871201010907891,3.871201010907891,
3.871201010907891,2.70805020110221]
```

```
(%i22) A+B;
(%o22) [3.218875824868201,3.871201010907891,3.871201010907891,
3.871201010907891,2.70805020110221]
```

```
C = A + B
log(x*y) = log(x) + log(y)
```

2 Quotientenregel

Figure 2: Logarithmus eines Quotienten

x	y	x/y	log(x)	log(y)	log(x/y)	log(x)-log(y)
1	25	0,04	0	1,39794001	-1,39794001	-1,39794001
2	24	0,08333333	0,30103	1,38021124	-1,07918125	-1,07918125
3	16	0,1875	0,47712125	1,20411998	-0,72699873	-0,72699873
4	12	0,33333333	0,60205999	1,07918125	-0,47712125	-0,47712125
5	3	1,66666667	0,69897	0,47712125	0,22184875	0,22184875

```
(%i23) x:[1,2,3,4,5];
      y:[25,24,16,12,3];
```

```
(%o23) [1,2,3,4,5]
```

```
(%o24) [25,24,16,12,3]
```

```
(%i25) x/y, numer;
```

```
(%o25) [0.04,0.0833333333333333,0.1875,0.333333333333333,
1.6666666666666667]
```

```
(%i26) A:map(log,x), numer;
      B:map(log,y), numer;
```

```
(%o26) [0,0.69314718055995,1.09861228866811,1.386294361119891,
1.6094379124341]
```

```
(%o27) [3.218875824868201,3.178053830347946,2.772588722239781,
2.484906649788,1.09861228866811]
```

```
(%i28) C:map(log,x/y), numer;
```

```
(%o28) [-3.218875824868201,-2.484906649788,-1.673976433571672,-
1.09861228866811,0.51082562376599]
```

```
(%i29) A-B;
```

```
(%o29) [-3.218875824868201,-2.484906649788,-1.673976433571671,-
1.09861228866811,0.51082562376599]
```

```
C = A - B
```

```
log(x/y) = log(x)-log(y)
```

3 Potenzregel

Figure 3: Logarithmus einer Potenz

x	n	x^n	log(x)	log(x^n)	n*log(x)
1	3	1	0	0	0
2	2	4	0,30103	0,60205999	0,60205999
3	4	81	0,47712125	1,90848502	1,90848502
4	5	1024	0,60205999	3,01029996	3,01029996
5	0,5	2,23606798	0,69897	0,349485	0,349485

```
(%i30) x:[1,2,3,4,5];  
      n:[3,2,4,5,0.5];  
(%o30) [1,2,3,4,5]  
(%o31) [3,2,4,5,0.5]  
  
(%i32) A:map(log,x),numer;  
(%o32) [0,0.69314718055995,1.09861228866811,1.386294361119891,  
1.6094379124341]  
  
(%i35) potenz(a,b):=a**b;  
(%o35) potenz(a,b):=a^b  
  
(%i39) P:map(potenz,x,n);  
(%o39) [1,4,81,1024,2.23606797749979]  
  
(%i40) B:map(log,P),numer;  
(%o40) [0,1.386294361119891,4.394449154672439,6.931471805599453,  
0.80471895621705]  
  
(%i41) n*A;  
(%o41) [0,1.386294361119891,4.394449154672439,6.931471805599453,  
0.80471895621705]  
  
B = n . A  
  
log(x^n) = n log(x)
```