

Kettenbrüche

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1 Kettenbrüche erzeugen

Befehle für Kettenbrüche `cf` `cfdisrep` `cfexpand` `cflength`

1.1 von Hand

```
(%i7) p:%pi, numer;
```

```
(%o7) 3.141592653589793
```

```
--> array(kette,20);
```

```
(%o30) kette
```

```
--> kette[1]:3;
```

```
(%o31) 3
```

```
--> dez:p-kette[1];
```

```
(%o32) 0.14159265358979
```

```
--> kpk:1/dez;
```

```
(%o33) 7.062513305931052
```

```
--> kette[2]:floor(kpk);  
dez:kpk-kette[2];
```

```
(%o34) 7
```

```
(%o35) 0.062513305931052
```

```
--> kpk:1/dez;
```

```
(%o36) 15.9965944066841
```

```
--> kette[3]:floor(kpk);  
dez:kpk-kette[3];
```

```
(%o37) 15
```

```
(%o38) 0.9965944066841
```

```

--> kpk:1/dez;
(%o39) 1.003417231015

--> kette[4]:floor(kpk);
      dez:kpk-kette[4];
(%o40) 1
(%o41) 0.0034172310150002

--> kpk:1/dez;
(%o42) 292.6345908750125

--> kette[5]:floor(kpk);
      dez:kpk-kette[5];
(%o43) 292
(%o44) 0.63459087501246

--> kpk:1/dez;
(%o45) 1.575818435744699

--> kette[6]:floor(kpk);
      dez:kpk-kette[6];
(%o46) 1
(%o47) 0.5758184357447

--> kpk:1/dez;
(%o48) 1.736658533182795

--> kette[7]:floor(kpk);
      dez:kpk-kette[7];
(%o49) 1
(%o50) 0.7366585331828

--> pikette:[kette[1],kette[2],kette[3],kette[4],kette[5],kette[6],kette[7]];
(%o51) [3, 7, 15, 1, 292, 1, 1]

```

1.2 Anzeigen

```

--> cdisrep(pikette);
(%o52) 
$$3 + \frac{1}{7 + \frac{1}{15 + \frac{1}{1 + \frac{1}{292 + \frac{1}{1 + \frac{1}{1}}}}}}$$


```

1.3 Kettenbruch automatisch

```

--> cf(p);
(%o95) [3, 7, 15, 1, 292]

```

```
--> cflength:4$
```

```
--> cf(p);
(%o97) [3, 7, 15, 1, 292]
```

```
--> cfdisrep(%);
(%o13)  $3 + \frac{1}{7 + \frac{1}{15 + \frac{1}{1 + \frac{1}{292}}}}$ 
```

```
--> cflength:4;
(%o14) 4
```

```
--> cf(sqrt(2));
(%o148) [1, 2, 2, 2, 2]
```

```
--> w2:cfdisrep(%);
(%o149)  $1 + \frac{1}{2 + \frac{1}{2 + \frac{1}{2 + \frac{1}{2}}}}$ 
```

```
--> ev(w2);%,numer;sqrt(2),numer;
(%o150)  $\frac{41}{29}$ 
(%o151) 1.413793103448276
(%o152) 1.414213562373095
```

□ 1.4 Programm, das den Kettenbruch ausgibt

```
(%i1) kette(z,lang):=block(
    local(li,vor,k,dez,i),
    vor:floor(z), dez:z-vor,
    li:[vor],
    for i:1 thru lang do
    (k:1/dez,
    li:append(li,[floor(k)]),
    dez:k-floor(k),
    if dez<0 then i:lang+1
    ),
    return(li)
)$
```

```
(%i8) kette(p,3);
      cfdisrep(%);
      ev(%);%,numer; p,numer;
```

```
(%o8) [3, 7, 15, 1]
```

```
(%o9) 3 +  $\frac{1}{7 + \frac{1}{15 + \frac{1}{1}}}$ 
```

```
(%o10)  $\frac{355}{113}$ 
```

```
(%o11) 3.141592920353983
```

```
(%o12) 3.141592653589793
```

```
(%i23) kette((sqrt(5)+1)/2,5);
      cfdisrep(%);
      ev(%);%,numer; (sqrt(5)-1)/2,numer;
```

```
(%o23) [1, 1, 1, 1, 1, 1]
```

```
(%o24) 1 +  $\frac{1}{1 + \frac{1}{1 + \frac{1}{1 + \frac{1}{1 + \frac{1}{1}}}}}$ 
```

```
(%o25)  $\frac{13}{8}$ 
```

```
(%o26) 1.625
```

```
(%o27) 0.61803398874989
```

```
(%i28) cf((-1+sqrt(5))/2);
      cfdisrep(%);
      ev(%); %,numer;
      (-1+sqrt(5))/2,numer;
```

```
(%o28) [0, 1, 1, 1, 2]
```

```
(%o29)  $\frac{1}{1 + \frac{1}{1 + \frac{1}{1 + \frac{1}{2}}}}$ 
```

```
(%o30)  $\frac{5}{8}$ 
```

```
(%o31) 0.625
```

```
(%o32) 0.61803398874989
```

```
(%i49) kette(15/17,3);
      cf(15/17);
      cfdisrep(%);
      ev(%);
```

```
(%o49) [0, 1, 7, 2]
```

```
(%o50) [0, 1, 7, 2]
```

```
(%o51) 
$$\frac{1}{1 + \frac{1}{7 + \frac{1}{2}}}$$

```

```
(%o52) 
$$\frac{15}{17}$$

```

```
(%i53) z:sqrt(5);
      kette(z,13);
      cfdisrep(%);
      ev(%);%,numer;
      z,numer;
      cf(z);
```

```
(%o53)  $\sqrt{5}$ 
```

```
(%o54) [2, 4, 4, 4, 4, 4, 4, 4, 4, 4, 4, 4, 4, 4]
```

```
(%o55) 
$$2 + \frac{1}{4 + \frac{1}{4 + \frac{1}{4 + \frac{1}{4 + \frac{1}{4 + \frac{1}{4 + \frac{1}{4 + \frac{1}{4 + \frac{1}{4 + \frac{1}{4 + \frac{1}{4 + \frac{1}{4 + \frac{1}{4}}}}}}}}}}}}}}}}$$

```

```
(%o56) 
$$\frac{299537289}{133957148}$$

```

```
(%o57) 2.23606797749979
```

```
(%o58) 2.23606797749979
```

```
(%o59) [2, 4]
```

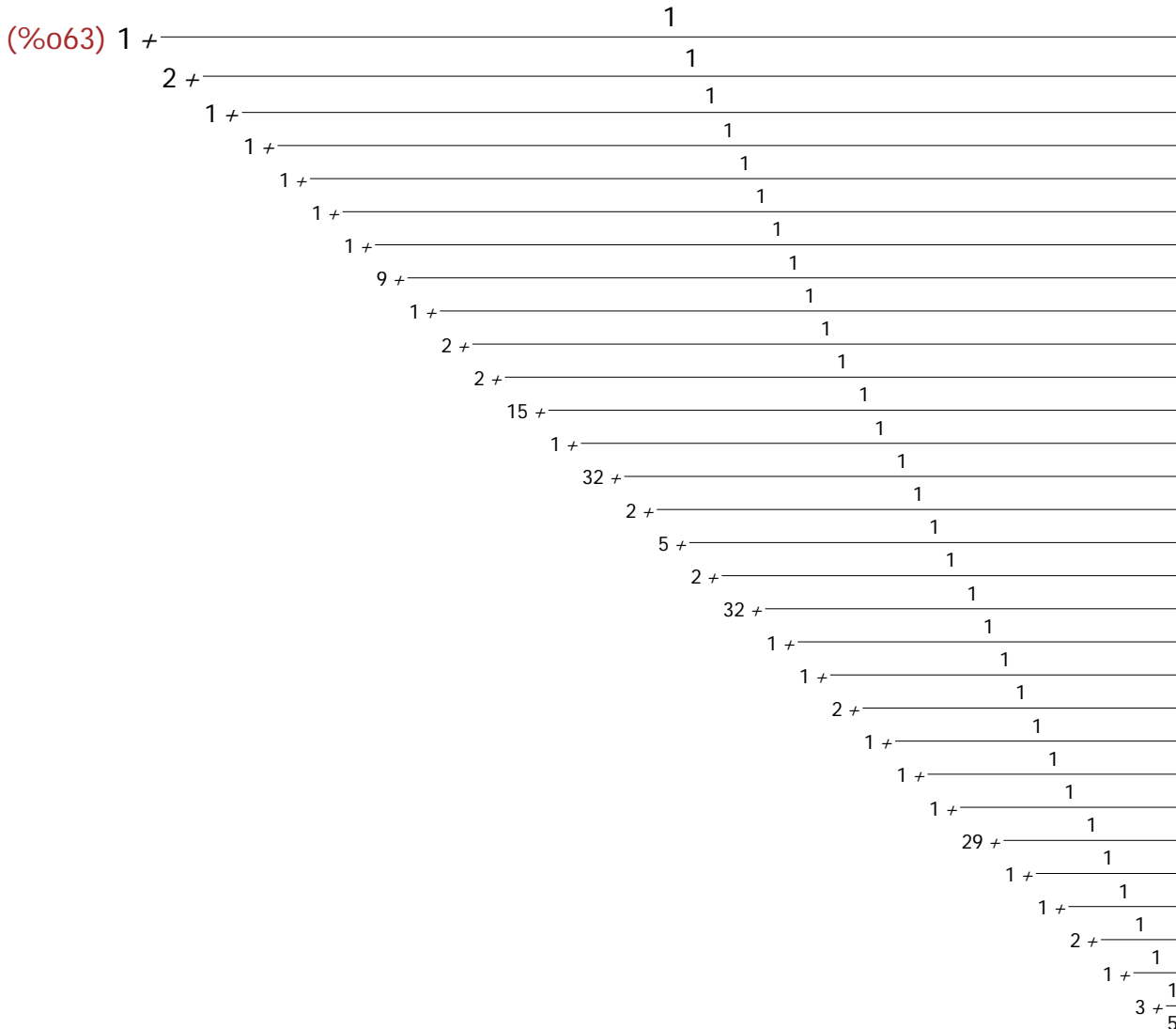
```
(%i60) kette(1.38117185,30);
```

```
(%o60) [1, 2, 1, 1, 1, 1, 1, 1, 9, 1, 2, 2, 15, 1, 32, 2, 5, 2, 32, 1, 1, 2, 1, 1, 1, 29, 1, 1, 2, 1, 3, 5]
```

```
(%i61) z:1.38117185;
kette(z,30);
cfdisrep(%);
ev(%)%;numer;
z,numer;
cf(z);
ev(%),numer;
```

(%o61) 1.38117185

(%o62) [1,2,1,1,1,1,1,9,1,2,2,15,1,32,2,5,2,32,1,1,2,1,1,1,29,1,1,2,1,3,5]



(%o64) $\frac{71759904401327}{51955811582264}$

(%o65) 1.38117185

(%o66) 1.38117185

(%o67) [1,2,1,1,1,1,1,9,1,2,2]

(%o68) [1,2,1,1,1,1,1,9,1,2,2]