Goedel's beta-function

```
def op(x,y):
    return (x+y)*(x+y)+x+1
```

```
op(23543530202986794769759, 5996397151772)
```

```
    554297814701304140674643538101662806856153721
```

```
def pair(c):
    u=floor(sqrt(c-1))
    if c-2<u^2+u:
        x=c-1-u^2
        y=u-x
    else:
        x=-1
        y=-1
    return (x,y)
```

```
pair(3883573573224762823464963388888)
```

```
    (-1, -1)
```

```
op(235435302029, 5996397151772)
```

```
    3883573573224762823464963l
```

```
def div(a,b):
    if b%a==0:
        return True
    else:
        return False
```

```
def beta(c,i):
    (x,y)=pair(c)
    if x==-1:
        return 0
    l=10
    for a in range(l):
        if div(1+(op(a,i)+1)*y,x):
            return a
    return 0
```

```
(3,5,0,1)
```

```
    (3, 5, 0, 1)
```

```
m=max(op(3,0),op(5,1),op(0,2),op(1,3))+1 # max von op(F(i),i)+1
m
```

```
43
```

```
y=LCM(range(1,43+1)) # kgV(1,...,43)
y
```

```
9419588158802421600
```

```
x=(1+(op(3,0)+1)*y)*(1+(op(5,1)+1)*y)*(1+(op(0,2)+1)*y)*
(1+(op(1,3)+1)*y)
x
```

```
5402925795327874598089632594126288613829186441519317072557730810451083349791531201
```

```
c=op(x,y)
print c
print pair(c)
```

```
291916071498193462721949690818278185840867523804102058826887923728792605284477172215576987485253700705354856369423091081862994065170892807032910480926095607276803
(5402925795327874598089632594126288613829186441519317072557730810451083349791531201, 9419588158802421600)
```

```
beta(c,3)
```

```
1
```

```
def seq(c):
    l=beta(c,0)
    print "Laenge der Sequenz ist",l
    print
    print "<",
    for i in range(l):
        print beta(c,i+1),
    print ">"
```

```
seq(c)
```

```
Laenge der Sequenz ist 3

< 5 0 1 >
```

```
m=max(op(2,0),op(1,1),op(2,0))+1
m
```

```
8
```

```
y=3*8*5*7
y
```

```
840
```

```
x=(1+(op(2,0)+1)*y)*(1+(op(1,1)+1)*y)*(1+(op(0,2)+1)*y)
x
```

```
199251579241
```

```
c=op(x,y)
c
```

```
    39701192164974407545803
```

```
seq(c)
```

```
    Laenge der Sequenz ist 2

    < 1 0 >
```

```
seq(24445524009903)
```

```
    Laenge der Sequenz ist 1

    < 1 >
```

```

```