

In [1]:

```
var('k,n')
assume(n,'integer')
assume(k,'integer')
# define s1(n) is the sum of k^3, where k from 1 to n
s1(n)=sum(k^3,k,1,n)
show(s1)
```

Out[1]:

$$n \mapsto \frac{1}{4}n^4 + \frac{1}{2}n^3 + \frac{1}{4}n^2$$

In [2]:

```
# define s2(n) is the square of the sum of k, where k from 1 to n
s2(n)=sum(k,k,1,n)^2
show(s2)
```

Out[2]:

$$n \mapsto \frac{1}{4}(n^2 + n)^2$$

In [3]:

```
show(expand(s2))
```

Out[3]:

$$n \mapsto \frac{1}{4}n^4 + \frac{1}{2}n^3 + \frac{1}{4}n^2$$

In [4]:

```
# check to see if s1(n)=s2(n)
# bool is boolean algebra, i.e. True or False
show(bool(s1==s2))
```

Out[4]:

True

In [5]:

```
latex(s1)
```

Out[5]:

```
n \ {\mapsto} \ \frac{1}{4} \ , \ n^{4} + \frac{1}{2} \ , \ n^{3} + \frac{1}{4} \ , \ n^{2}
```

In [6]:

```
term(x,n)=x^n
show(term)
```

Out[6]:

$(x, n) \mapsto x^n$

In [7]:

```
# x in (0,1)
assume(x<1)
assume(x>0)
# summing term by term x^n
s(x)=sum(term(x,n),n,0,oo)
# 1 + x + x^2 + x^3 + x^4 + x^5 + .....
show(s)
forget()
```

Out[7]:

$$x \mapsto -\frac{1}{x-1}$$

In [8]:

```
# x in (-1,0)
term(x,n)=x^n
assume(x>-1)
assume(x<0)
s(x)=sum(term(x,n),n,0,oo)
# 1 + x + x^2 + x^3 + x^4 + x^5 + .....
show(s)
forget()
```

Out[8]:

$$x \mapsto -\frac{1}{x-1}$$

In [9]:

```
var('x,n')
assume(n,'integer')
assume(x<1)
show(s)
```

Out[9]:

$$x \mapsto -\frac{1}{x-1}$$

In [10]:

```
show(maxima(s(x)).powerseries(x,0)._sage_())
```

Out[10]:

$$\sum_{i_1=0}^{+\infty} x^{i_1}$$

In [11]:

```
latex(maxima(s(x)).powerseries(x,0)._sage_())
```

Out[11]:

```
{\sum_{i_2=0}^{+\infty} x^{i_2}}
```

In [0]: