Limity posloupnosti

Zakladni limity jsou jednoduche:

```
>
> limit(n, n=infinity);
```

$$\infty$$

```
> limit(1/n, n=infinity);
```

$$0$$

```
>
>
> limit((1+a/n)^n, n=infinity);
```

$$\mathbf{e}^{a}$$

```
> limit(n/(n!)^(1/n), n=infinity);
```

$$\mathbf{e}$$

Program pocita s promennou n jeko s realnym cislem, proto nasledujici limitu spocita jeko interval [-1,1]:

```
> limit(sin(Pi*n), n=infinity);
```

$$-1 .. 1$$

Pro zachyceni pouze prirozenych hodnot n pouzijeme funkci floor:

```
> limit(sin(Pi*floor(n)), n=infinity);
```

$$0$$

```
>
```

Podobne zkusime dalsi posloupnost:

```
> limit((-1)^(2*n+1), n=infinity);
```

$$-1 .. 1$$

```
>
```

ale tady pouziti funkce floor nepomohlo:

```
> limit((-1)^(2*floor(n)+1), n=infinity);
```

$$\lim_{n \to \infty} (-1)^{(2\,\mathrm{floor}(n)+1)}$$

```
>
>
```

Fibonacciho posloupnost

```
> f:= proc(n) if n=1 or n=2 then 1 else f(n-1)+f(n-2) end if
  end proc;
```

$$f := \mathbf{proc}(n)\ \mathbf{if}\ n = 1\ \mathbf{or}\ n = 2\ \mathbf{then}\ 1\ \mathbf{else}\ \mathrm{f}(n-1)+\mathrm{f}(n-2)\ \mathbf{end\ if\ end\ proc}$$

```
> seq(f(n),n=1..15);
```

1, 1, 2, 3, 5, 8, 13, 21, 34, 55, 89, 144, 233, 377, 610

```
> seq(evalf(f(n+1)/f(n)),n=1..20);
```

1., 2., 1.500000000, 1.666666667, 1.600000000, 1.625000000, 1.615384615, 1.619047619, 1.617647059, 1.618181818, 1.617977528, 1.618055556, 1.618025751, 1.618037135, 1.618032787, 1.618034448, 1.618033813, 1.618034056, 1.618033963, 1.618033999

```
> (1+5^(1/2))/2;
```

$$\frac{\sqrt{5}}{2}+\frac{1}{2}$$

```
> evalf(%);
```

1.618033988

```
>
>
```