❖ Fonction « signal.butter »

```
signal.butter(N, Wn, btype='low', analog=False, output='ba'):
```

Butterworth digital and analog filter design.
Design an Nth order digital or analog Butterworth filter and return the filter coefficients in (B,A) or (Z,P,K) form.

Parameters

N : int
The order of the filter.

Wn : array_like
A scalar or length-2 sequence giving the critical frequencies.
For a Butterworth filter, this is the point at which the gain drops to 1/sqrt(2) that of the passband (the "-3 dB point").
For digital filters, `Wn` is normalized from 0 to 1, where 1 is the Nyquist frequency, pi radians/sample. (`Wn` is thus in half-cycles / sample.)
For analog filters, `Wn` is an angular frequency (e.g. rad/s).

btype : {'lowpass', 'highpass', 'bandpass', 'bandstop'}, optional
The type of filter. Default is 'lowpass'.

analog : bool, optional
When True, return an analog filter, otherwise a digital filter is returned.

output : {'ba', 'zpk'}, optional
Type of output: numerator/denominator ('ba') or pole-zero ('zpk').
Default is 'ba'.

Returns

b, a : ndarray, ndarray
Numerator (`b`) and denominator (`a`) polynomials of the IIR filter. Only returned if ``output='ba'``.

z, p, k : ndarray, ndarray, float
Zeros, poles, and system gain of the IIR filter transfer function. Only returned if ``output='zpk'``.

❖ Fonction « signal.cheby1»

```
signal.cheby1(N, rp, Wn, btype='low', analog=False, output='ba'):

Chebyshev type I digital and analog filter design.
Design an Nth order digital or analog Chebyshev type I filter and return the filter coefficients in (B,A)
or (Z,P,K) form.

  Parameters

                    N : int
                        The order of the filter.
                    rp : float
                        The maximum ripple allowed below unity gain in the passband.
                        Specified in decibels, as a positive number.
                    Wn : array_like
                        A scalar or length-2 sequence giving the critical frequencies.
                        For Type I filters, this is the point in the transition band at which
                        the gain first drops below -`rp`.
                        For digital filters, `Wn` is normalized from 0 to 1, where 1 is the
                        Nyquist frequency, pi radians/sample.  (`Wn` is thus in
                        half-cycles / sample.)
                        For analog filters, `Wn` is an angular frequency (e.g. rad/s).
                    btype : {'lowpass', 'highpass', 'bandpass', 'bandstop'}, optional
                        The type of filter.  Default is 'lowpass'.
                    analog : bool, optional
                        When True, return an analog filter, otherwise a digital filter is
                        returned.
                    output : {'ba', 'zpk'}, optional
                        Type of output:  numerator/denominator ('ba') or pole-zero ('zpk').
                        Default is 'ba'.


  Returns

                b, a : ndarray, ndarray
                    Numerator (`b`) and denominator (`a`) polynomials of the IIR filter.
                    Only returned if ``output='ba'``.
                z, p, k : ndarray, ndarray, float
                    Zeros, poles, and system gain of the IIR filter transfer
                    function.  Only returned if ``output='zpk'``.
```