Example 1

January 25, 2017

0.0.1 The Matlab or Octave or Python function "freqz" (we have a Python freqz function also in Moodle) can be used to plot the magnitude and phase plot of the transfer function of this filter. Its input are directly the coefficients a and b of the transfer function H(z), in the form:

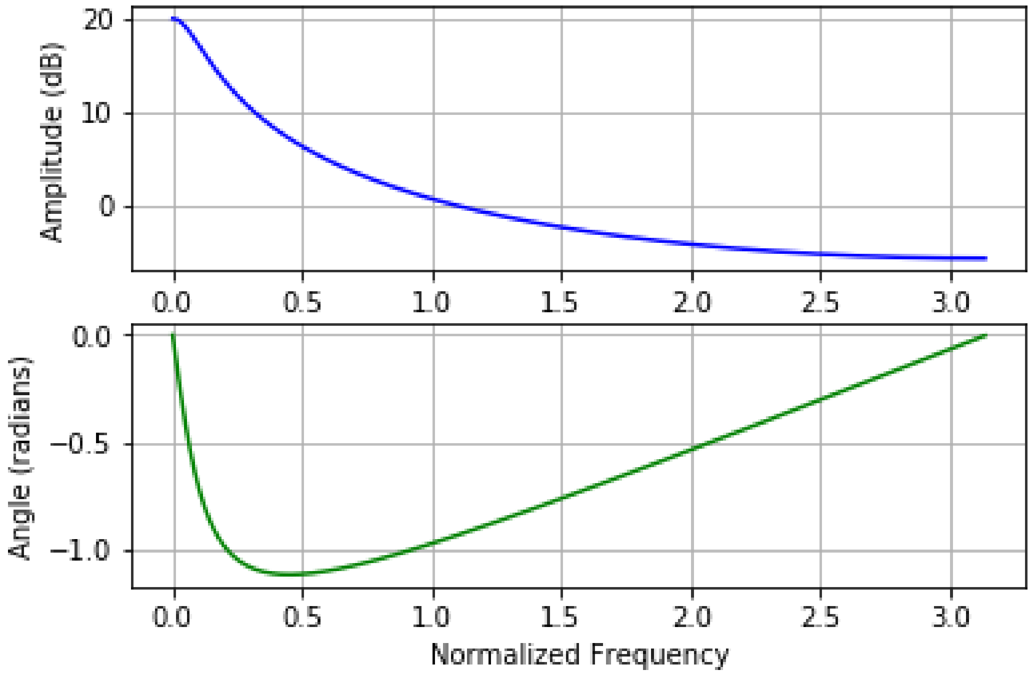
0.0.2

$$freqz(B, A),$$

0.0.3 If we choose $a(1) = p = 0.9$ in our example, we obtain

```
In [1]: %matplotlib inline
        import matplotlib.pyplot as plt
        from freqz import freqz
        import numpy as np
```

```
In [2]: A = [1, -0.9]
        B = [1]
        w = freqz(B, A) #w, h = freqz(B,A)
        print len(w)
```

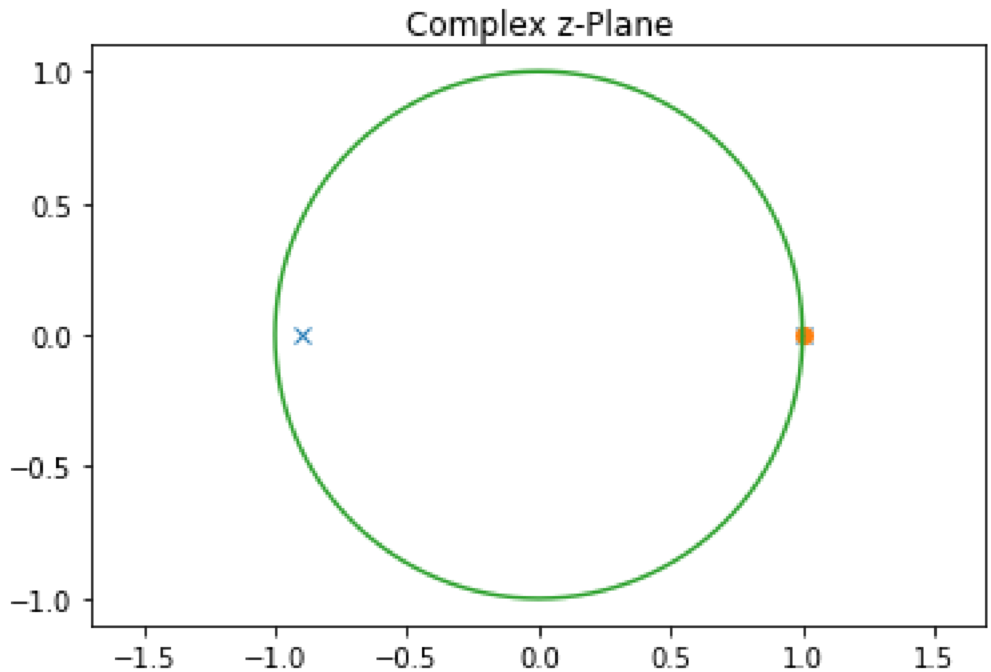



```
512
```

Observe that the horizontal axis is the normalized frequency (see last lecture), its right hand side is pi, which is the Nyquist frequency or half the sampling frequency. The frequency response we see here has a low pass characteristic.

We can use the command "zplane" (also in Moodle) to plot the location of the zeros and poles in the complex z-plane, with from zplane import zplane zplane(B,A)

```
In [3]: from zplane import zplane
        zplane(B,A)
```



Out[3]: ()

Zeros are marked with an "o", and poles are marked with an "x". Here we see the pole at location z=0.9.