

Bode Plotter

This problem will walk you through creating a basic low pass or high pass filter bode plot in iPython.

- (a) **Follow the instructions in the iPython notebook to create a lambda function *getOmegap* that takes in a resistance R and a capacitance C and returns the pole frequency (omegap) of the RC tandem.**
- (b) Now we will build the *getImpedance* function. Given a circuit component, we know the impedance may be a function of omega. Therefore, we might not know a component's impedance without knowing the frequency. **Fill in the blanks in the skeleton code for the *getImpedance* function, where the outer function calls a higher order function that calculates the impedance of resistors or capacitors.**
- (c) **Fill in the code creating an impedance divider function.** Note this function uses the boolean *RC_circuit* to decide if the numerator is a resistor or capacitor.
*Hint: This function makes several calls to the *getImpedance* function!*
- (d) Fill in the *getMag* function, which takes in a transfer function and a frequency and outputs the magnitude of the transfer function at the specified frequency.
*Hint: Use *np.linalg.norm* and the given *num* and *den* variables!*
- (e) Fill in the *getPhase* function, which takes in a transfer function and a frequency and outputs the phase of the transfer function at the specified frequency.
*Hint: Use *np.angle* to find the arctangent of a complex number!*
Now you have successfully (hopefully) created a bode plotter!
- (f) Try out some example circuits to confirm your understanding of bode plots and to check your code. Write down any comments you may have. Does your iPython plot match up with a hand-calculated plot?