1.2)

1. Code in RCCircuit.

2. As h gets smaller, the time between each step gets smaller. This doesn’t make it any less accurate – it just means there need to be more iterations. As h get larger, the time between each gap gets larger, so it looks as if the capacitor starts with V\_C = V\_in even though it doesn’t. This occurs because the time step is too large to observe what is occurring. Charging behavior itself doesn’t change, but perception of it does. Theoretical charging curve looks almost the same as LDS curve with a good choice of h.

3. tau = RC, the time constant quantifies how long it takes to charge the capacitor.

2.2)

1. Code in RLCircuit.

2. Steady state voltage across capacitor after it is fully charged is equal to V\_in. Steady state voltage across inductor after it is fully charged is equal to 0. Steady state current across capacitor after it is fully charged is equal to 0. Steady state current across inductor after it is fully charged is equal to as if it were a wire/closed circuit – essentially, I=V/R.

3.2)

1. Code in RLCCircuit

2. Low values of R start at lower amplitudes and end at higher amplitudes. High values of R start at higher amplitudes and end at lower amplitudes. Higher values of L decrease the frequency. Lower values of L increase the frequency. Low values of C increase frequency. High values of C decrease frequency. NOT SURE ON THIS ONE!

3. Output looks like a shrunk and strangely inverted version of the original voltage sine wave. Amplitudes for initial voltage are much larger and go way more into the negative. The output looks very different. For small frequencies, the output is very different from the input. They look much more similar at high frequencies. This would be a high-pass filter because only high frequency signals go through – low frequency signals don’t go through nearly as much. Small and high amplitudes don’t change anything due to normalization. Higher frequencies make higher notes, lower frequencies make lower notes.