Seth Pregler
ECEN 489-508
02.07.22

Lab 2 Postlab Submission

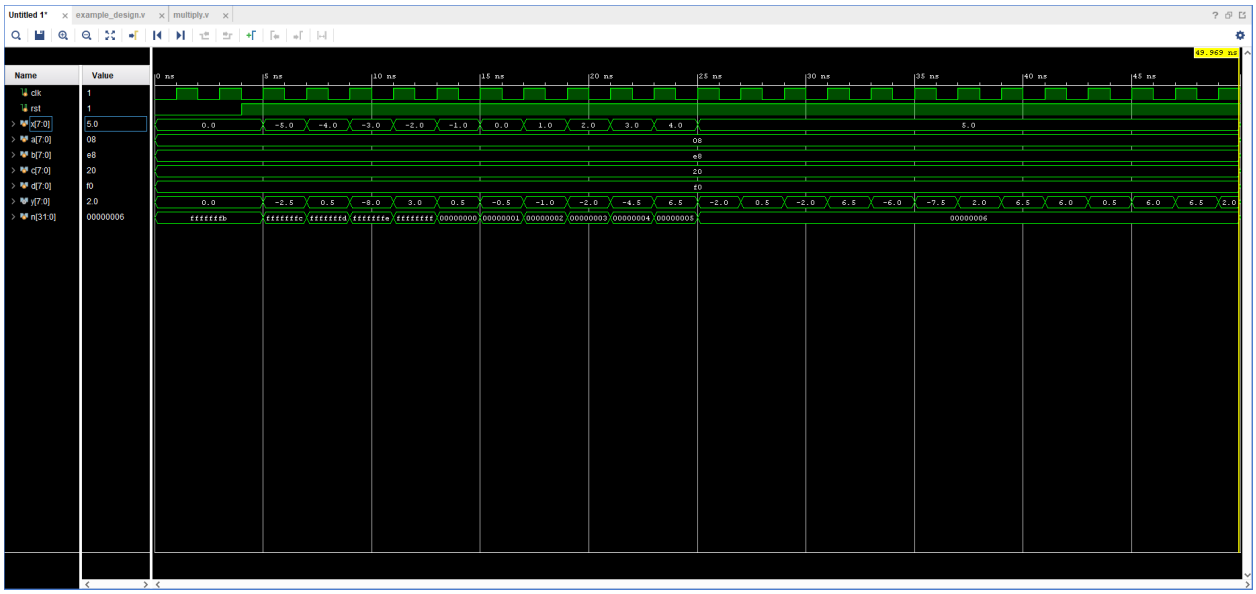

Figure 1 - Behavior Simulation of IIR Design

Figure 1 shown above, demonstrates the behavioral simulation of the IIR filter. The input signal ranges from -5 to 5 and the output signal y, outputs the result for each iteration. Unlike the FIR filter, the IIR filter uses past inputs and outputs to compute the result. Comparing the results with the Python reference file, we can see that the results are equivalent to that of the y_Q34 column. This column accounts for overflow and represents the result in Q4.4 notation where the MSB is the sign bit.

```
Reference for IIR:
y[0] =  -2.5    y_Q34[0] =  -2.5
y[1] =  0.5     y_Q34[1] =  0.5
y[2] =  8.0     y_Q34[2] =  -8.0
y[3] =  19.0    y_Q34[3] =  3.0
y[4] =  32.5    y_Q34[4] =  0.5
y[5] =  47.5    y_Q34[5] =  -0.5
y[6] =  63.0    y_Q34[6] =  -1.0
y[7] =  78.0    y_Q34[7] =  -2.0
y[8] =  91.5    y_Q34[8] =  -4.5
y[9] =  102.5   y_Q34[9] =  6.5
y[10] =  110.0  y_Q34[10] =  -2.0
```

Figure 2 - Output from ref_FIRIIR.py