RC Circuits

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Purpose

The purpose of these exercises is to give some practice in measuring AC across components and to provide some observation regarding Fourier components of waves. Most of what is done in this lab will be related back to the equation $V_{out} = V_{in}\frac{R_2}{R_1+R_2}$ though resistances will be replaced by the AC equivalent of resistance, the impedance Z. $V_{out} = V_{in}\frac{Z_2}{Z_1+Z_2}$

Procedure

Compare the calculated values of the V_{rms} against those values obtained by a DMM for a square wave and for a triangle wave. Using the waveform on an oscilloscope, determine the time constant τ of an RC circuit with $R = 10k\Omega$ and $C = 22nF$. How does this compare to the theoretical value? Check the differentiating and integrating properties of the circuit.

Data

	Square Wave	Triangle Wave
Measured:	1	0.58
Calculated:	1.0	0.57

Table 1: Comparison of V_{rms}

	Time Constant(tau)
Measured(ms):	240
Calculated(ms):	220

Table 2: Comparison of τ

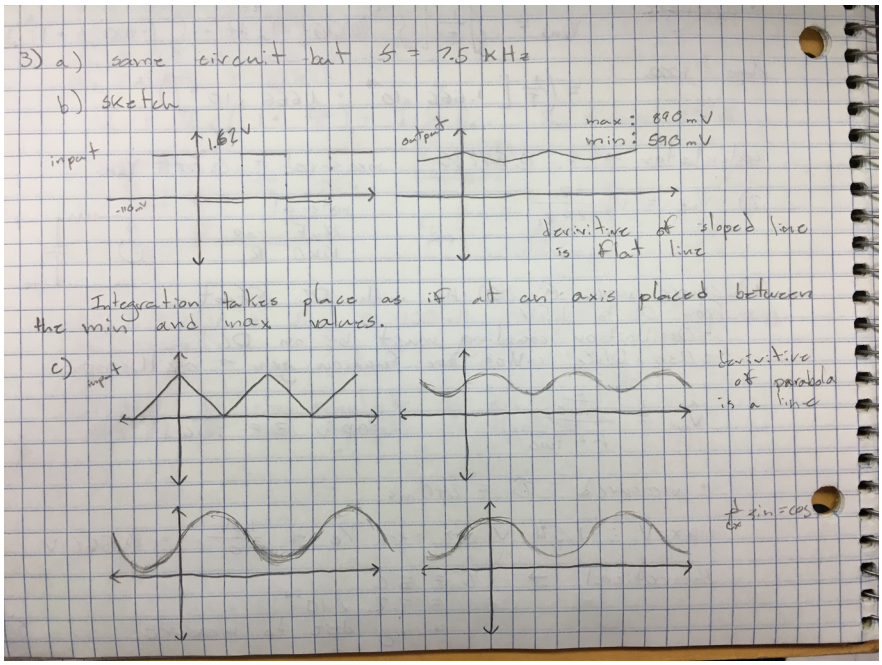

Figure 1: Integration circuit analysis

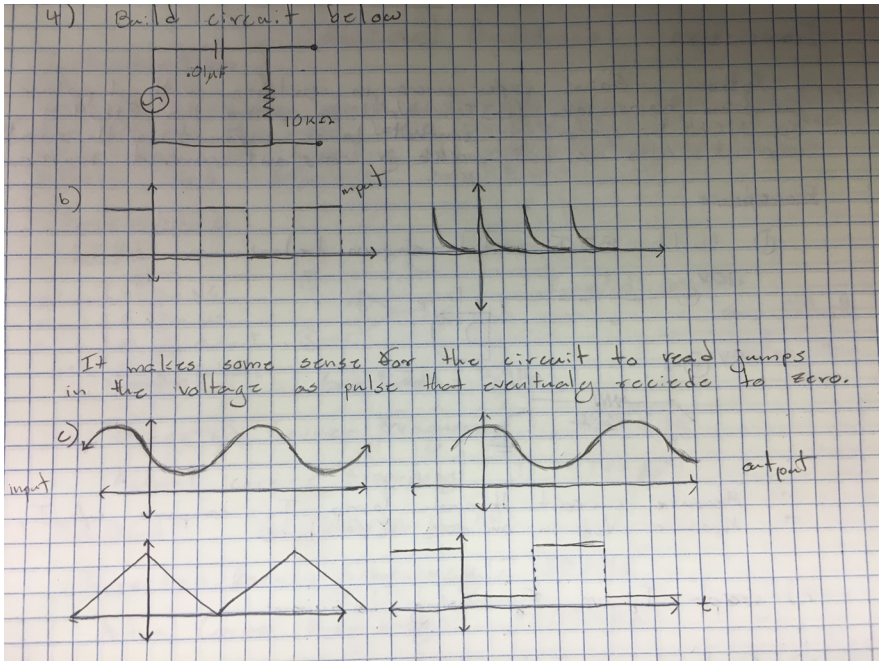

Figure 2: Differentiation circuit analysis

Results

The Integration and differentiation of a circuit will occur as if it has been taken around the central part of the incoming waveform. Some discrepancies occur when evaluating the differentiation of a square wave which may be taken as the evaluation of a pulse.