Homework 1 Electronics Basics

1. *Resistor network analysis*

Use only 1 kΩ resistors to create a network with an equivalent resistance of 667Ω.

1. What is the minimum number of required resistors?

Show your work. (10)

1. Simulate and validate your design on Multisim.

Insert your Multisim circuit schematic image here. (10)

1. Simple voltage divider

Use network analysis and Ohm’s Law to derive a formula for $V\_{out}$for an unloaded voltage divider.

1. Assuming you have a source voltage $V\_{in}$ and two resistors $R\_{1}$ and $R\_{2}$.

Show your work here. (10)

1. Validate your formula by simulation. You may test at any values of $V\_{in}$, $R\_{1}$ and $R\_{2}$ of your own choice.

Plugin my formula, Vout= V; my simulation Vout = V (5)

Insert your Multisim circuit schematic image here. (5)

1. Voltage divider with load

Assuming that $R\_{1}$ ,$ R\_{2}$ and $R\_{L}$ are 1 kΩ resistors and $V\_{in}$ is 10V, compute $V\_{out}$ for both a loaded voltage divider and an unloaded voltage divider.

1. How much does the output voltage change when it is loaded?

Unloaded Vout= V;

Loaded Vout = V; How much change? . (5)

Show your work: (5)

1. Validate your results with simulation.

Unloaded Vout= V; my simulation Vout = V

Loaded Vout = V; my simulation Vout = V (5)

Insert your two Multisim circuit schematics here (one unloaded, one loaded). (5)