1) Equivalent impedances
a


$$
\mathrm{C}_{1}:=8 \cdot 10^{-9} \mathrm{~F} \quad \mathrm{C}_{2}:=6 \cdot 10^{-9} \mathrm{~F} \quad \mathrm{C}_{3}:=610^{-9} \mathrm{~F} \quad \mathrm{C}_{4}:=3 \cdot 10^{-9} \mathrm{~F} \quad \mathrm{C}_{5}:=6.5 \cdot 10^{-9} \mathrm{~F}
$$

1.1: For the above circuit, determine the equivalent capacitance between $A$ and $B$

1.2: For the above circuit, determine the equivalent inductance between $A$ and $B$
2) Amplifier circuits

2.1: For the RL amplifier circuit, determine the relationship between Vout and Vin. As with RC amplifier circuits, KCL is a good starting point. (The power is taken out for simplicity but the op amp is powered).
2.2: What type of op amp is this?

2.3: In the above circuit $\mathrm{V} 1=\mathrm{V} 2=1 \sin (2 \pi \mathrm{ft})$ where the frequency is 1 kHz . Determine Vout.
3) Voltage/Current continuity


In the above circuit, the voltage is defined as follows:

$$
V 1=\left\{\begin{array}{cc}
5 V & t<0 \\
10 V & 0<t
\end{array} \quad \text { (the voltage source turns on at } t=0\right. \text { ) }
$$

3.1: Determine a mathematical expression for the source.
3.2: At $t=0$ - (just before the voltage changes), for the polarities indicated, determine the voltage across each component and the current through each component.
3.3: At $\mathrm{t}=0^{+}$(just after the voltage changes), determine the voltage across each component and the current through each component for the polarities indicated in the circuit.
4) First order circuits

4.1: Determine the voltage as a function of time for the source voltage $\mathrm{V} 1=10 \mathrm{u}(\mathrm{t})$.
4.2: Determine the voltage as a function of time for the source voltage
5. First order switching circuit


In the above circuit, the voltage source turns on at $t=0$. Switch $U 1$ closes at $t=0.1 \mathrm{~ms}$. Switch U2 closes and switch U3 opens at $t=0.3 \mathrm{~ms}$ (effectively putting resistor R3 in series with C3 at $\mathrm{t}=0.3 \mathrm{~ms}$ ).
5.1: Determine the voltage across $R 3$ as a function of time for $t>0$.

