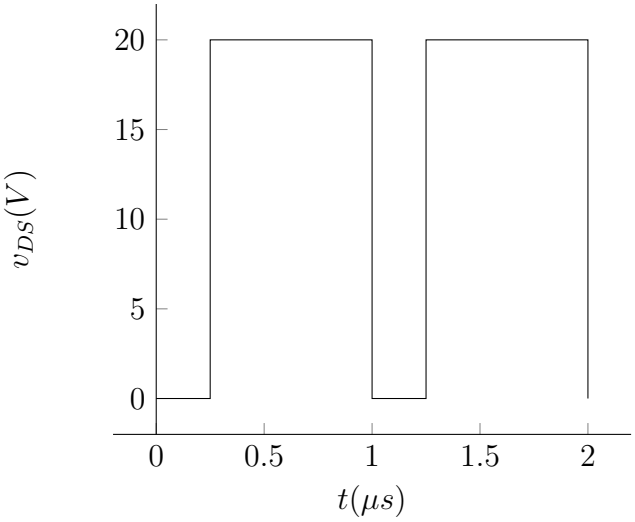
ECEN 4797 Fall 2014 **Vince Coghlan**

Homework #1

a) What is the duty ratio, D, of the converter?
The duty ratio is $D = \frac{V_{IN}}{V_{OUT}} = \frac{5}{20} = \frac{1}{4}$.

b) Sketch the waveform of the MOSFET drain-to-source voltage, v_{DS}. Label the numerical values of all relevant times and voltages.
First we assume that the MOSFET is on, this means that the voltage accross the inductor is $V_L = V_{IN}$. And that means that $V_DS = 0V$. When the MOSFET is off, we can see that $V_L = V_{IN} - V_{OUT} = -15V$. In this case, $V_{DS} = 20V$



c) Find the DC component of the voltage waveform of art (b). How does this value relate to the value of V_{IN}? Does this make sense and why? The DC component of this waveform is $15V$. This input voltage is $5V$. We can do this because our output current will become lower than before. This fact maintains the same power.