## ECE 320 - Homework #6

H-Bridge, DC to DC Converters, DC to AC Converters. Due Wednesday, February 21st, 2018

## **H-Bridges**

1) Determine the voltages and currents for the follownig H-bridge. Assume 3904/3907 transistors:

- $\beta = 100$
- $V_{ce(sat)} = 0.2 V$
- $V_{be} = 0.7 V$

2) Modify this circuit so that I = 200 mA (approx)

3) Simulate your circuit for problem #2 in PartSim. Check that the voltages and currents you compute are correct.

- 4) Lab: A dual H-brigde is a L1110 (\$0.91 ea shown right). Connect
  - Vcc = +12V
  - gnd = 0V
  - A-1A and A-1B are the control inputs (0V / 5V).
  - MOTOR-A: DC motor

Measure the voltage across the motor for the following inputs:



Forward		Stp[		Reverse	
A-1A	A-1B	A-1A	A-1B	A-1A	A-1B
0V	5V	0V	0V	5V	0V



## DC to DC Converters (Buck converters)

- 5) Find the voltage (DC and AC) for V1 and V2
- 6) Modify this circuit so that
  - The voltage at V2 is 8VDC
  - With a ripple of 2Vpp when C = 0, and
  - With a ripple of 0.5Vpp with C > 0.
- 7) Check your analysis in PartSim (or similar program)



## **DC to AC Converters**

8a) Determine the first two terms of the Fourier series for the following waveform

 $y(t) \approx a + b \cdot \cos(\omega t + \phi)$ 

8b) How much of the total energy is contained in these two terms?

