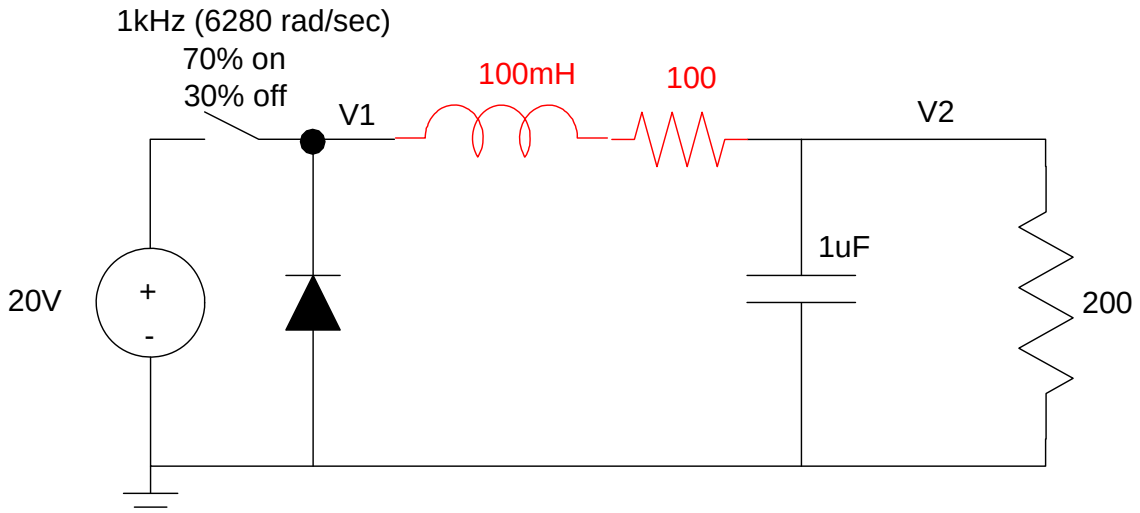
ECE 320 - Quiz #5 - Name _____

DC to DC Converters, Fourier Transforms. October 4, 2018

1) A Buck converter converts 20VDC to another voltage. Determine the DC and AC votlages at V1 and V2 for the followign DC to DC converter.

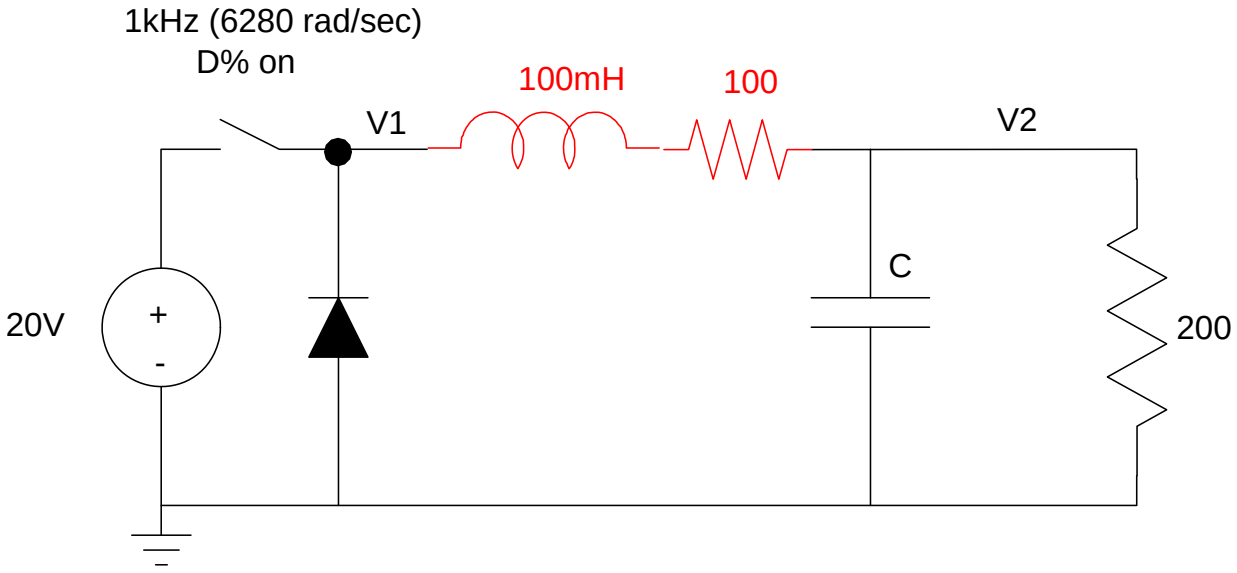
V1		V2	
DC: V1	AC: V1pp	DC: V2	AC: V2pp



2) Determine the DC voltage at V1, the duty cycle (D), and C so that

- The DC votlage at V2 is 5.00V, and
- The ripple at V2 is 100mVpp

DC Voltage at V1	Duty Cycle (D)	C



3) Assume x(t) is periodic in 2π. Determine the Fourier transform (DC term and the 1st-harmonic) for the following waveform:

$$x(t) = \begin{cases} 20V & 0 < t < 2 \\ 0V & 2 < t < 2\pi \end{cases}$$

DC Term	1st Harmonic (cosine and sine)	
$a_0 = \frac{1}{2\pi}\int_0^{2\pi} x(t) \cdot dt$	$a_1 = \frac{2}{2\pi}\int_0^{2\pi} x(t) \cdot \cos(t) \cdot dt$	$b_1 = \frac{2}{2\pi}\int_0^{2\pi} x(t) \cdot \sin(t) \cdot dt$

4) Assume x(t) is periodic in 2π. Determine the complex Fourier transform (1st-harmonic) for the following waveform:

$$x(t) = \begin{cases} 20V & 0 < t < 2 \\ 0V & 2 < t < 2\pi \end{cases}$$

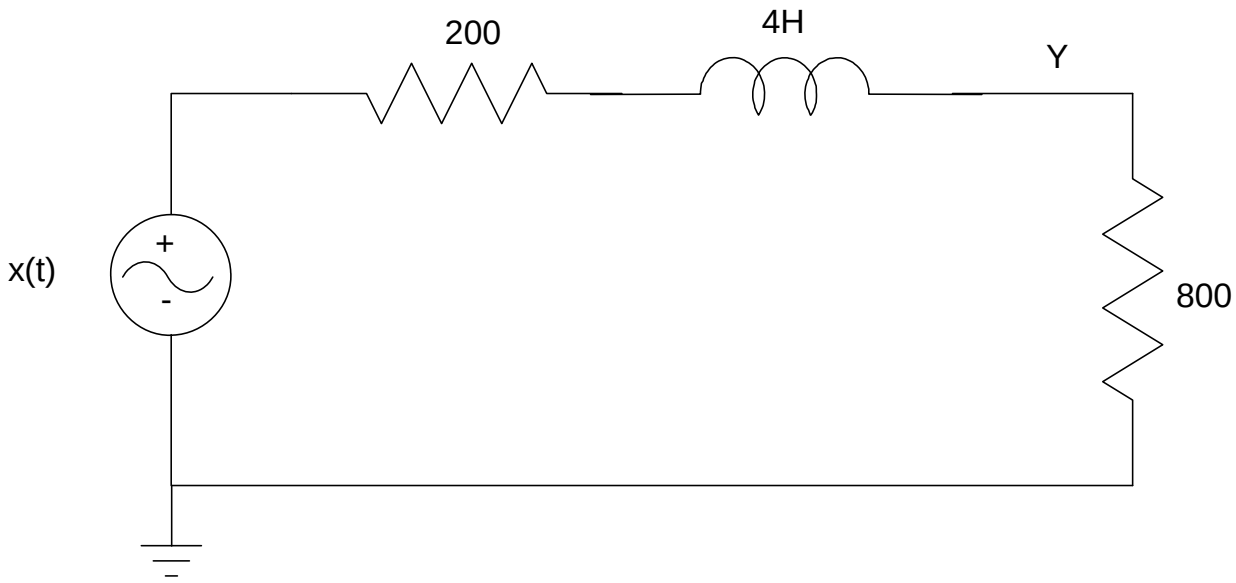
$X_1 = \frac{2}{2\pi} \int_0^{2\pi} x(t) \cdot e^{-jt} \cdot dt$

5) Assume the Fourier transform for x(t) is

$$x(t) = 3 + 4\cos(100t) + 5\sin(200t)$$

Find y(t)

y(t) =



Bonus: Name one person who is running for the U.S. Senate from where you vote.