

Stuff Exam 1 Monday, 2/10/03

Chapters 1 & 2, Lectures through 1/31

HWs 1 - 8 Understand problems.

Try some old exams (Web HW page, download view and print ASAP, some people have trouble with my pdf files).

HW #9, due M, 2/10

Ch. 3, Ex3.1 - Ex3.5, Repeat Ex3.1 - Ex3.5 using the 0.7V drop model of the diode.

Ex3.4c book ans. wrong, should be: -5V

HW #10 handout, due F, 2/14

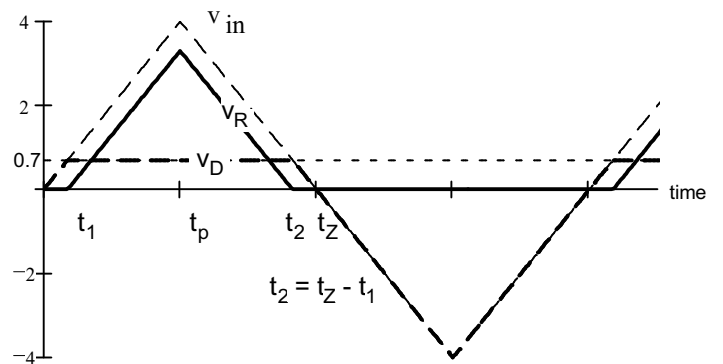
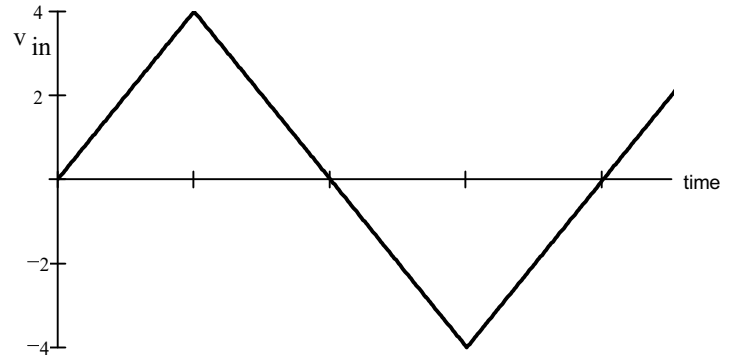
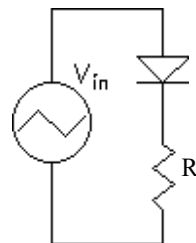
Diodes in AC Circuits

Last time we analyzed DC circuits with diodes. Naturally, you know what's next. We'll start with some triangular waveforms to get the general idea.

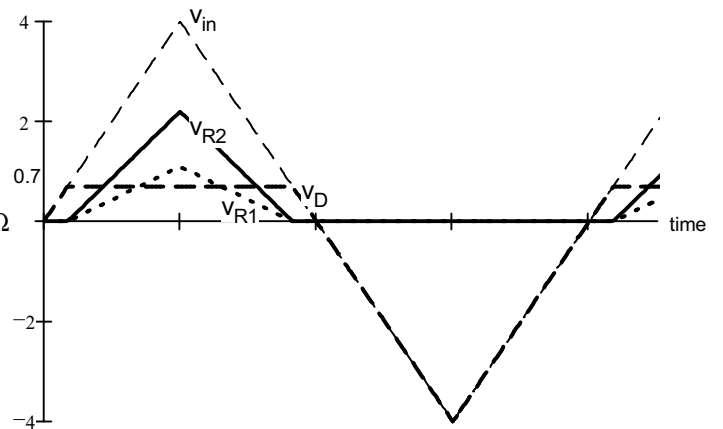
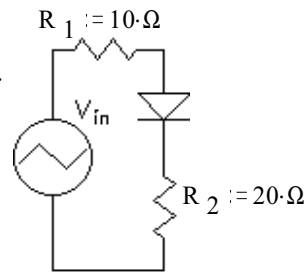
Diode doesn't conduct until v_{in} reaches 0.7V, so 0.7V is a dividing line between the two models of the diode.

$$\text{slope} = \frac{0.7 \cdot V}{t_1} = \frac{V_p}{t_p}$$

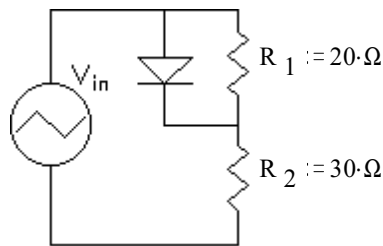
$$t_1 = \frac{0.7 \cdot V}{V_p} \cdot t_p$$



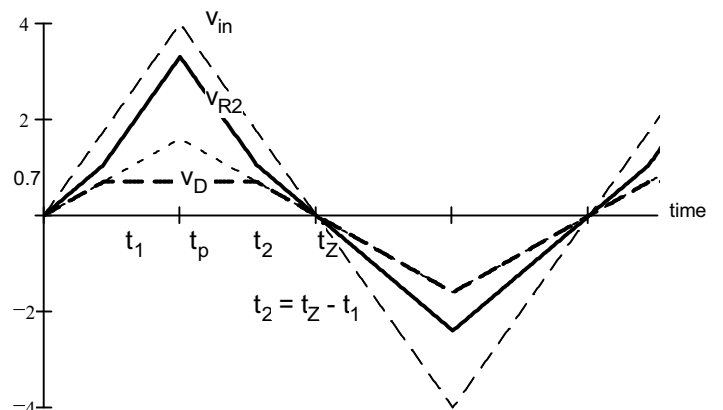
When the diode conducts, you're left with a voltage divider



Sometimes it's helpful to figure out what the voltage across the diode would be if it never conducted.



$$t_1 = \frac{0.7 \cdot V}{V_p \cdot \frac{R_1}{R_1 + R_2}} \cdot t_p$$

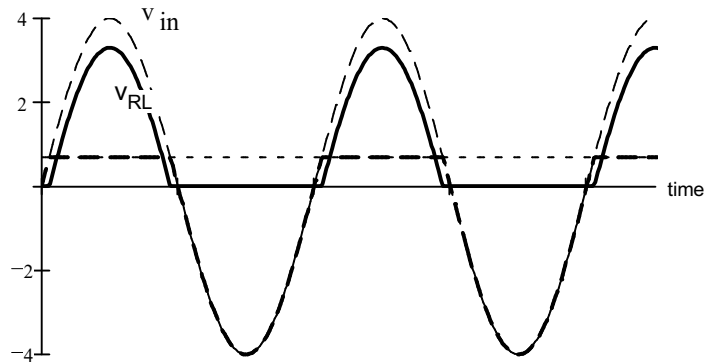
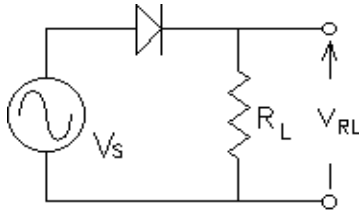


Rectifier Circuits & Power Supplies

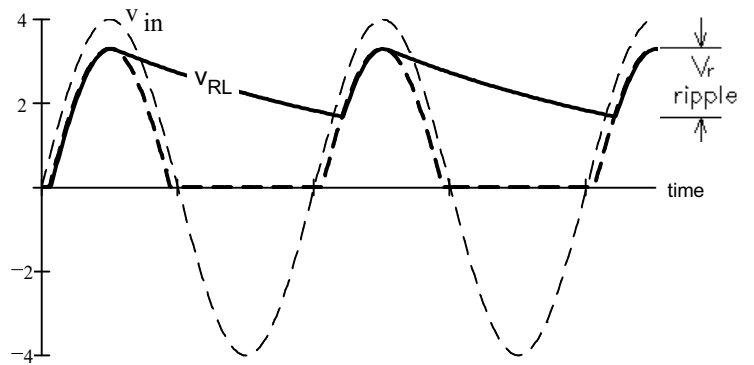
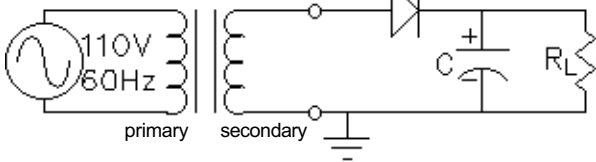
Half-wave rectification

What if the input is a sine wave?

V_{RL} is now DC, although a bit bumpy. Some things are better if they're bumpy, but not roads and not DC voltages.



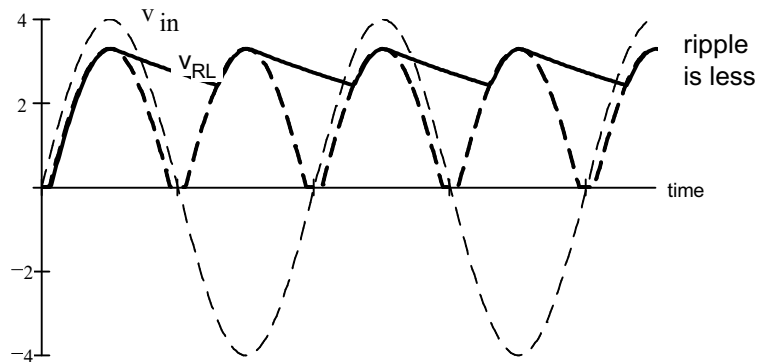
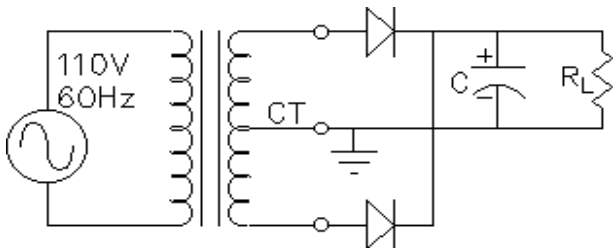
Rectification is the process of making DC from AC. Usually the AC is derived from the AC wall outlet (often through a transformer) and the DC is needed for electronic circuitry modeled by R_L here.



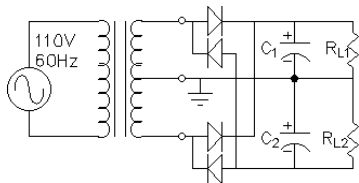
A "filter" capacitor (usually a big electrolytic) helps smooth out the bumps, although it sure looks like we could a bit bigger one here. The remaining bumpiness is called "ripple", V_r is peak-to-peak ripple

Full-wave rectification

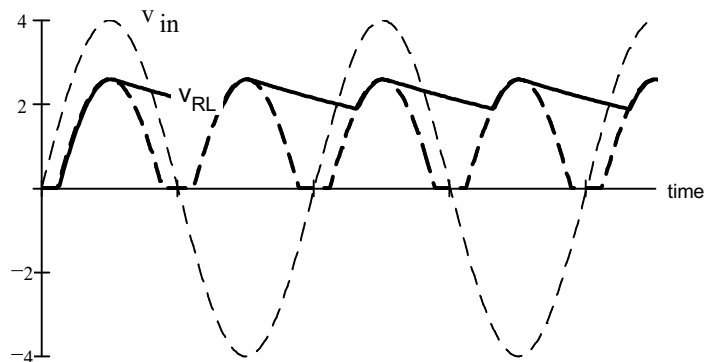
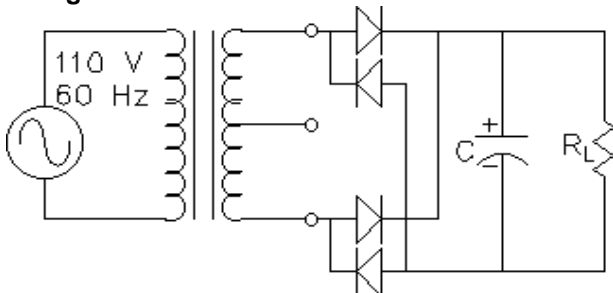
The "center tap" in the secondary of this transformer makes it easy to get full-wave rectification.



The center-tap transformer is also good for making + - supplies



Bridge



A "bridge" circuit or "bridge rectifier" can give you full-wave rectification without a center-tap transformer, but now you loose another "diode drop"

Bridge rectifiers are often drawn like this:

