

Union College
ECE 248
Spring 2018
Homework #1

Due Wednesday April 11, 2018

Read: Use chapter 1 as a review of circuit concepts that will be used in ECE248

Chapter 2 sections 2-1 to 2-11 and 2-15.

Chapter 3 sections 3-1 to 3-3, 3-5 to 3-7, and 3-11

Chapter 4 sections 4-1, sections 4-10 to 4:12

Unless otherwise noted, all problems from Malvino & Bates (8th ed)

A. Basic Diode Circuits (assume second approximation)

3-9

3-11

3-28 You should get $R = 215 \text{ ohm}$

3-29

3-33

B. Half-Wave Rectifier (assume second approximation)

4-3 The AC source is actually $50 V_{\text{RMS}}$ (remember $V_{\text{RMS}} = V_{\text{PEAK}}/\sqrt{2}$)
Also, DC and average voltages are the same thing.

4-4 The AC source is actually $15 V_{\text{RMS}}$.
You should get $V_{\text{OUT,P}} = -20.5\text{V}$ and $V_{\text{DC}} = -6.5\text{V}$.

4-17 AC source is actually $120 V_{\text{RMS}}$.

4-20 You should get $V_{\text{RIPPLE}} = 14.6\text{V}$, which is quite large!

4-xx Derive the expression $V_{\text{DC}} = V_{\text{p}}/\pi$ for the DC voltage of a half-wave rectifier.

C. Clippers and Limiters (assume second approximation)

4-33 Assume $R_{\text{S}} = 1 \text{ k}\Omega$ and $R_{\text{L}} = 10 \text{ k}\Omega$

4-34 Same as 4-33

4-35

4-36 Resist the temptation to use Eq. 4-18, since it gives the wrong answer! A good approach to solve this problem is to replace the voltage divider with its Thevenin equivalent.
You should get $V_{\text{OUT,MAX}} = 10.7\text{V}$.

D. Clampers and Multipliers (assume second approximation unless otherwise noted)

4-38

4-39

4-40 The ideal diode has zero voltage drop.