

# EECS 16A    Designing Information Devices and Systems I

## Fall 2020    Homework 6

**This homework is due Friday, October 9, 2020, at 23:59.**

**Self-grades are due Monday, October 12, 2020, at 23:59.**

### Submission Format

Your homework submission should consist of **one** file.

- `hw6.pdf`: A single PDF file that contains all of your answers (any handwritten answers should be scanned)

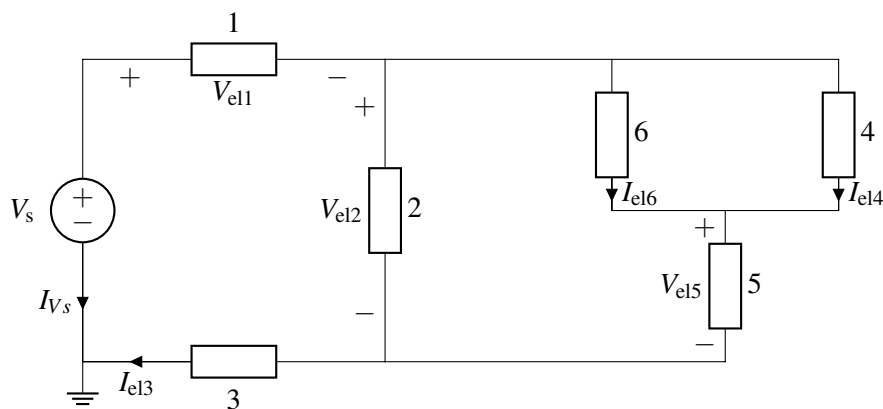
Submit the file to the appropriate assignment on Gradescope.

### 1. Reading Assignment

For this homework, please read Note 11, which introduces the basics of circuit analysis. Also, please review the circuit analysis procedure at the following link: <https://eecs16a.org/lecture/mod2/nva.html>. You are always welcome and encouraged to read beyond this as well. **Question to answer: What is the value of having a systematic procedure for solving circuits?**

### 2. Intro to Circuits

(Contributors: Panagiotis Zarkos)



- (a) How many nodes does the above circuit have? Label them.

*Note:* The ground node has been selected for you, so you don't need to label that, but you need to include it in your node count.

- (b) Notice that elements 1 - 6 and the voltage source  $V_s$  have either the *voltage across* or the *current through* them not labeled. Label the missing *voltages across* or *currents through* for elements 1 - 6, and the voltage source  $V_s$ , so that they all follow **passive sign convention**.
- (c) Express all element voltages (including the element voltage across the source,  $V_s$ ) as a function of node voltages. This will depend on the node labeling you chose in part (a).

- (d) Write one KCL equation that involves the currents through elements 1 and 2.
- (e) Write a KVL equation for all the loops that contain the voltage source  $V_s$ . These equations should be a function of element voltages and the voltage source  $V_s$ .

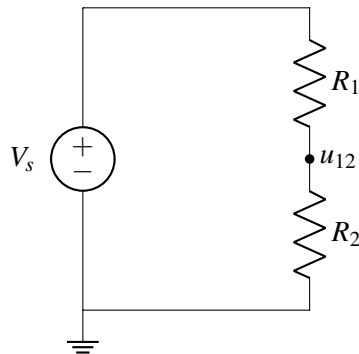
### 3. Voltage divider

(Contributors: Adhyyan Narang, Panagiotis Zarkos, Sashank Krishnamurthy, Urmita Sikder)

In the following parts,  $V_s = 12\text{V}$ . Choose resistance values such that the current through each element is  $\leq 0.8\text{A}$ .

*Hint: You can follow the process outlined in <https://eecs16a.org/lecture/mod2/nva.html> to solve these parts. Other valid circuit solving methods are also acceptable.*

- (a) Select values for  $R_1$  and  $R_2$  in the circuit below such that  $u_{12} = 6\text{V}$ . This is a **design problem**, so there can be more than one set of correct answers to this problem.



### 4. Homework Process and Study Group

Who did you work with on this homework? List names and student ID's. (In case you met people at homework party or in office hours, you can also just describe the group.) How did you work on this homework? If you worked in your study group, explain what role each student played for the meetings this week.