EECS 16A Designing Information Devices and Systems I
Fall 2020 Homework 1

This homework is due September 4, 2020 at 23:59.
Self-grades are due September 7, 2020 at 23:59.

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

- `hw1.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 0 and Note 1 until Section 1.6. This will provide an overview of linear equations and augmented matrices. You are always welcome and encouraged to read ahead beyond this as well. Write a paragraph about how this relates to what you have learned before and what is new.

2. **Survey** To complete this part of the HW, you only have to fill out the two surveys and indicate in your submitted answer that you filled them both out. Nothing else is required.

   (a) We would like to get to know you all a bit better, please do tell us about yourself!
   https://forms.gle/WvHnBYhtynEUmBn36

   (b) Since students won't have the chance to get to know each other in the usual way this semester, we are trying a new pilot plan to organize study groups for you all. Please give us some information that will help us create study groups for all of you.
   https://forms.gle/BMquudoWAFTcmzm77

3. **Syllabus**

   Read the course syllabus and answer the following questions. The syllabus can be found here: https://eecs16a.org/policies.html.

   (a) What are the dates and times for both midterms and the final exam? If you live in a timezone other than the Pacific Time zone (for Berkeley) compute what times these correspond to for you.

   (b) If you need exam accommodation whom do you contact and how?

   (c) When is homework 1 due? When is homework 1's self-grade due? In general, what day of the week is the homework due and at what time? In general, what day of the week are the self-grades due and at what time? If you live in a timezone other than the Pacific Time zone (for Berkeley) compute what times these correspond to for you.

   (d) When are homework parties? Homework parties are where groups of students can get together to work on the homework together.

(e) How many homework drops do you get? Reminder, the homework drop is for extenuating circumstance such as getting sick, family emergencies etc. You should plan on completing and submitting all homeworks and self-grades.

(f) If you miss a homework, can you resubmit it for partial credit after the solutions are released? When do you have to submit it by?

(g) What is the penalty if you turn in your self-grades up to one week late?

(h) What score will you get on a homework if you do not submit your self-grades?

(i) There are two ways to get participation credit in the course — by either attending discussions live, or by watching a recorded discussion. Describe the procedures to get discussion credit for both types of participation. How many discussions do you need to attend to get full participation credit?

(j) Fill in the blank: You should attend one discussion section on _____ and one discussion section on _____ each week.

(k) Provide a complete list of everything you must do in order to receive credit for your homework assignments.

(l) Read the following guide: www.tinyurl.com/ee16a-gradescope. What are the five steps in the submission process for a PDF on Gradescope? Please note that if you do not select pages for each question/subquestion we cannot grade your homework and we will be forced to give you a 0.

(m) If you submit your homework but forget to select pages, can you reselect pages?

(n) What percentage do you need to get on a homework assignment for you to get full credit for the assignment?

(o) Will the exams in this class be proctored via personal zoom recordings?

(p) Fill in the blank:
If you miss ___ or more labs you will fail the class.

(q) Fill in the blank:

During buffer lab periods, you may get checked off for atmost _____ missed lab that occurred during that lab module by attending your _____ section.

4. Homework resources

If you need help on a homework problem or have a question about the material, what are some of the resources you might be able to use?

(i) Homework party

(ii) TA office hours

(iii) Professor office hours

(iv) Asking a friend taking 16A

(v) Posting on Piazza

(vi) Going to discussion

(vii) All of the above

5. Counting Solutions

Learning Goal: *(This problem is meant to illustrate the different types of systems of equations. Some have a unique solution and others have no solutions or infinitely many solutions. We will learn in this class how to systematically figure out which of the three above cases holds.)*

Directions: For each of the following systems of linear equations, determine if there is a unique solution, no solution, or an infinite number of solutions. If there is a unique solution, find it. If there is an infinite number of solutions, describe the set of solutions. If there is no solution, explain why. **Show your work**.

Example: We first provide an example to show two ways to solve systems of linear equations. At this point, we only expect you to be able to follow the first approach. The second approach, Gaussian elimination, will be covered in class and in Note 1. **You may use either approach to solve the following problems. You will receive many more practice problems on Gaussian Elimination later on, do not worry if you do not want to use the Gaussian Elimination approach.**

$$\begin{aligned} 2x &+ 3y &&= 5 \\ x &+ y &&= 2 \end{aligned}$$

Solution A

$$2x+3y = 5 \tag{1}$$
$$x+ y = 2 \tag{2}$$

Subtract: (1) - 2*(2)

$$y = 1 \tag{3}$$

Now we plug in (3) into (2) and solve for x

$$x+ 1 = 2$$
$$\rightarrow \quad x = 1 \tag{4}$$

From (3) and (4), we get the unique solution:

$$x = 1$$
$$y = 1$$

Solution B

$$\left[\begin{array}{cc|c} 2 & 3 & 5 \\ 1 & 1 & 2 \end{array}\right] \rightarrow \left[\begin{array}{cc|c} 1 & \frac{3}{2} & \frac{5}{2} \\ 1 & 1 & 2 \end{array}\right] \text{using } R_1 \leftarrow \tfrac{1}{2}R_1$$
$$\rightarrow \left[\begin{array}{cc|c} 1 & \frac{3}{2} & \frac{5}{2} \\ 0 & -\frac{1}{2} & -\frac{1}{2} \end{array}\right] \text{using } R_2 \leftarrow R_2 - R_1$$
$$\rightarrow \left[\begin{array}{cc|c} 1 & \frac{3}{2} & \frac{5}{2} \\ 0 & 1 & 1 \end{array}\right] \text{using } R_2 \leftarrow -2R_2$$
$$\rightarrow \left[\begin{array}{cc|c} 1 & 0 & 1 \\ 0 & 1 & 1 \end{array}\right] \text{using } R_1 \leftarrow R_1 - \tfrac{3}{2}R_2$$

Unique solution, $\begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} 1 \\ 1 \end{bmatrix}$

(a)

$$\begin{aligned} x + y + z &= 3 \\ 2x + 2y + 2z &= 5 \end{aligned}$$

(b)

$$\begin{aligned} -y + 2z &= 1 \\ 2x + z &= 2 \end{aligned}$$

(c)

$$\begin{aligned} x + 2y &= 3 \\ 2x - y &= 1 \\ 3x + y &= 4 \end{aligned}$$

(d)

$$\begin{aligned} x + 2y &= 3 \\ 2x - y &= 1 \\ x - 3y &= -5 \end{aligned}$$