

2240 Active Learning Handwrite

Welcome to linear algebra! Work with your classmates as you handwrite your responses to the following. You can handwrite on this handout or use a stylus to electronically write on the PDF that is available online.

1. **Tuesday-Thursday Class:** I reward and value your engagement and active learning in this class, where you will try course activities and get feedback from your peers and/or me as you are working. This may feel harder than a lecture style where you are mostly listening rather than doing—here you are mostly doing!—but educational research shows that it is much better for your learning!

ASU designates that “Face-to face component is not a lecture but provides time for discussion, demonstrations, problem-solving, and higher-level thinking and collaborative activities. Class time is used to apply course content in ways that can only be accomplished when everyone is together in the same place”
<https://cetlss.appstate.edu/teaching-learning/course-delivery-options>.

ASU prepares students to employ various modes of communication that can help communities reach consensus or respectful disagreement: successful communicators interact effectively with people of both similar and different experiences and values and in this class you will practice oral and written communication during class by interacting with your peers and me. Regardless of gender, political party, race, religion, sexuality, or more this class is to be a welcoming environment, and so I want you to be sensitive and respectful to each other in upcoming discussions. Keep it a safe place to express meaningful ideas and opinions. Actively listen to others and encourage everyone to participate. Part of the welcoming environment is to keep an open mind as you engage in our class activities, explore consensus and employ collective thinking across barriers. Maintain a professional tone, show respect and courtesy, and make your contributions matter.

Write down any questions you have on the above or draw me a smiley face if you don't have any questions. If you need more room on this or any other question, attach an additional sheet.

2. **Building Community Part 1:** Introduce yourself to the people around you—what are their preferred first names? If you weren't able to be there, give reference to anyone you had help from or write N/A otherwise.
3. Discuss with your classmates and then respond: Describe where did lines and planes arise in Calculus II with Analytic Geometry?

4. Next, read the following and respond as directed



Evelyn Boyd Granville was the second Black woman we know of to earn her PhD in mathematics. Dr. Granville's original research related to complex numbers but she also worked on numerous space missions, including Project Mercury, the first manned space flight program: *I can say without a doubt that this was the most interesting job of my lifetime - to be a member of a group responsible for writing computer programs to track the paths of vehicles in space* (Granville, 1989).

Dr. Granville told me that

My favorite challenge to teachers and children is to solve the following problem using three different methods: Rabbits and chickens have been placed in a cage. You count 48 feet and seventeen heads. How many rabbits and how many chickens are in the cage? (Granville, 2007)

Let x be the number of rabbits and y be the number of chickens. Write a linear equation in terms of x and y that expresses how many heads there are.

5. Write a linear equation in terms of x and y that expresses how many feet there are.

6. Discuss with your classmates methods from Calculus II with Analytic Geometry, our prerequisite, and prior courses to solve this system of 2 linear equations in the 2 unknowns. Write down any questions you have or draw me a smiley face if you don't have any questions.

7. Consider the function $f(n) = \begin{cases} \frac{n}{2} & \text{if } n \text{ is even} \\ 3n + 1 & \text{if } n \text{ is odd} \end{cases}$

Choose one whole number from 1 to 5 as a starting value n_0 and repeatedly apply this function to it, i.e. $f(n_0), f(f(n_0)), f(f(f(n_0))) \dots$. Stop if you repeat 3 numbers in a row. Write the sequence of numbers you obtain, starting with your n_0 and continuing until it shows a repetition of 3 numbers in a row.

8. After a couple of minutes, regardless of whether the sequence repeated 3 numbers in a row or not, compare to your classmates. Share your sequences, check them, help each other, and write them down. If you all tried the same starting value for n_0 , try some others here.

9. Discuss and respond: Make a group conjecture about the limits of sequences obtained via starting with any positive whole number $n > 0$ (not just 1 to 5) and applying $f(n) = \begin{cases} \frac{n}{2} & \text{if } n \text{ is even} \\ 3n + 1 & \text{if } n \text{ is odd} \end{cases}$
- Is there always a repetition of 3 numbers in a row?

10. Discuss and respond: Can you find any counterexamples to your group conjecture?

11. **Building Community Part 2:** If you are finished discussing and responding to the above before I bring us back together, chat to get to know your classmates better. Look for connections like perhaps classes other than linear algebra, majors and minors, where you call home, future plans (for break, next summer or after graduation). . . If you had time to complete this, write down something you found interesting. Leave it blank otherwise.

Help each other and PDF responses of first two handwrites to ASULearn: If you are finished with the handwrite before I bring us back together, first ensure that your entire group is finished too, and if not, help each other. Then take a look at upcoming class work in the class handouts.

For next week, you'll collate your handwritten responses from today as well as the next class as one full size multipage PDF for submission in the ASULearn assignment. Handwrites have strict deadlines that are listed on the course calendar as well as in ASULearn.

Linear Algebra FAQ and Engagement—Optimize your Success and Understanding!

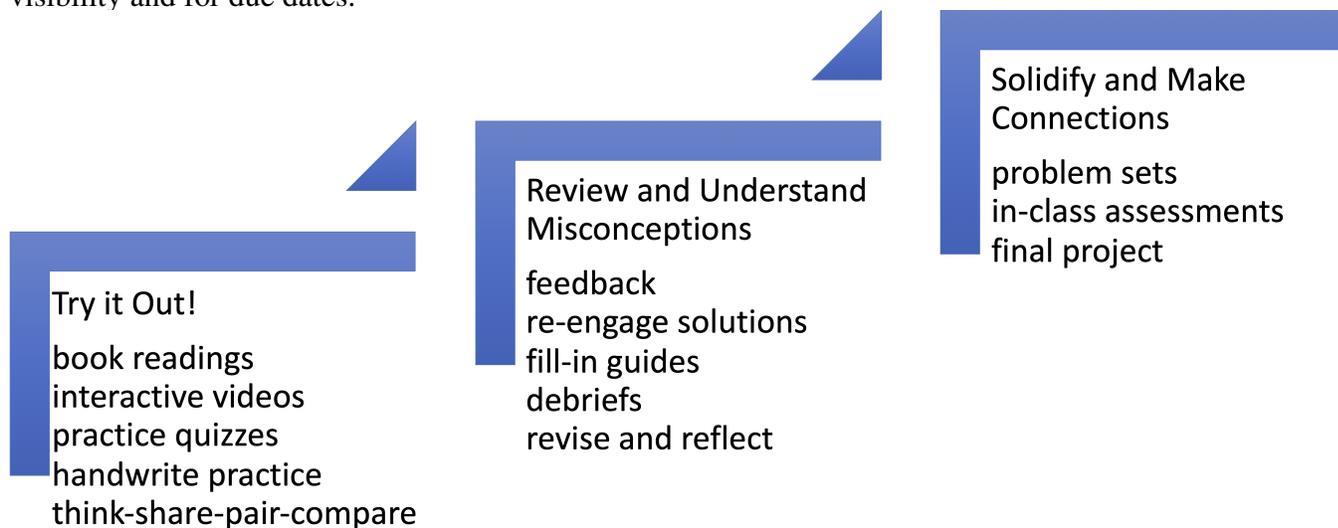
- Where can I find in-class and out-of-class activities?    

On our ASULearn! See the modules with the activities organized by due dates. A tentative calendar with in-class listings, slides and explorations is near the top of the page.

Look for the completion items under its date and turn it in on ASULearn.

Problem Sets are also turned in on ASULearn, but they are not paired with a completion box.

The ASULearn components work best from scrolling through the activities themselves on a computer as the calendar and the Moodle mobile app does not always show everything as designed, both for visibility and for due dates.



- How do I contact you outside of class?

need help from me, your classmates, or tech support? at the top of ASULearn (not e-mail!)

The Zoom link there is for office hours

Sunday, Tuesday, Thursday 7–7:45pm

Monday, Wednesday 8:30-9:10am

If you can't make Zoom, select the dropdown item listing only you and I to contact me privately, or the whole class to send a message to everyone! Please use a salutation of Dr. Sarah, my preferred name, in communications with me. I strive to answer individual questions at least once a day, including the weekends, although I may respond within class. I prefer that you use Zoom hours as it is easier to discuss material in person.

- What should I do if I don't understand content or something about the course?

Ask me and your classmates questions inside and outside of class and review our activities in ASULearn—I have designed many resources to help you. Reviewing slides, videos, practice quizzes and solutions can often clear up confusion. We can also go over material in Zoom hours, like on a whiteboard. While other sources can be great to offer different explanations, I caution that they may have very different language and content—be sure you use our language and only what we have covered up to that point in handwrites and problem sets. We are following select parts of our book in an intentional ordering. One early example is row echelon form—we are using the book definition rather than some others that look different.

If it is an ASULearn activity, I have instructions inside each activity link on ASULearn, at the top. Ask me any questions. Access (or re-watch) the course intro interactive video, which explains many components. My course design is intentional and based on best practices from the scholarship of teaching and learning including *Make it Stick: The Science of Successful Learning*. Depending on your prior experiences, it may take some getting used to—I'm here to help you!

Tentative Calendar

Handwrites, begin assignments and major assignments have strict deadlines of 9:50am the next academic day. All other activities are those you should attempt for completion by then, but you'll have 2nd chances that remain open until closer to the corresponding in-class assessment. Some days are lighter than others and it will help you to progress on upcoming activities in advance, especially major assignments. Plan to spend 3.5–5 hours between classes, on average, as per the University-wide Statement on Student Engagement with Courses (while we don't meet synchronously for the third hour, its time in and out of class are a part of this computation).

	Class Monday	Between Classes (by 9:50am Wednesday)	Class Wednesday	Between Classes (by 9:50am Monday)
1/18			active learning hand-write course overview module 1 overview t-shirt Wednesday	2240 interactive video download Maple (free) access e-text 1.1 read the e-text 1.1 interactive video 1.1 practice quiz syllabus
1/23– 1/25	1.1 handwrite, activities	turn in 2 handwrites 1.2 read the e-text 1.2 interactive video 1.2 practice quiz Maple intro video practice submitting PDF add ASULearn profile pic Zoom update & profile pic	1.2 handwrite, activities t-shirt Wednesday	re-engage 1.1 handwrite turn in 1.2 handwrite 1.3 read the e-text 1.3 interactive video 1.3 practice quiz
1/30– 2/1	1.3 handwrite, activities	re-engage 1.2 handwrite turn in 1.3 handwrite 1.4 read the e-text 1.4 interactive video 1.4 practice quiz	1.4 handwrite, activities t-shirt Wednesday	re-engage 1.3 handwrite turn in 1.4 handwrite 1.5 read the e-text 1.5 interactive video 1.5 practice quiz
2/6– 2/8	1.5 handwrite, activities	re-engage 1.4 handwrite turn in 1.5 handwrite 1.7 read the e-text 1.7 interactive video 1.7 practice quiz begin problem set 1	1.7 handwrite, activities t-shirt Wednesday	re-engage 1.5 handwrite turn in 1.7 handwrite card sort 1 review 1 practice quiz
2/13– 2/15	group review 1	re-engage 1.7 handwrite debrief 1.1–1.5, 1.7 problem set 1	group debrief 1 module 2 overview t-shirt Wednesday	re-engage problem set 1 2.1 read the e-text 2.1 interactive video 2.1 practice quiz
2/20– 2/22	2.1 handwrite, activities	turn in 2.1 handwrite 2.2 read the e-text 2.2 interactive video 2.2 practice quiz	2.2 handwrite, activities t-shirt Wednesday	re-engage 2.1 handwrite turn in 2.2 handwrite 2.3 read the e-text 2.3 interactive video 2.3 practice quiz
2/27– 3/1	2.3 handwrite, activities	re-engage 2.2 handwrite turn in 2.3 handwrite 2.8 read the e-text 2.8 interactive video 2.8 practice quiz	2.8 handwrite, activities t-shirt Wednesday	re-engage 2.3 handwrite turn in 2.8 handwrite 2.9 read the e-text 2.9 interactive video 2.9 practice quiz begin problem set 2

3/6– 3/8	2.9 handwrite, activities	re-engage 2.8 handwrite turn in 2.9 handwrite card sort 2 review 2 practice quiz begin study guide	group review 2 t-shirt Wednesday	re-engage 2.9 handwrite debrief 2.1–2.3, 2.8, 2.9 problem set 2
3/20– 3/22	group debrief 2 module 3 overview	re-engage problem set 2 glossary 1 prepare for assessment complete open items	in-class assessment 1 t-shirt Wednesday	1.8–1.9 read the e-text 1.8–1.9 interactive video 1.8–1.9 practice quiz
3/27– 3/29	1.8–1.9 handwrite, activities	turn in 1.8–1.9 handwrite 6.1 read the e-text 6.1 interactive video 6.1 practice quiz	6.1 handwrite, activities t-shirt Wednesday	re-engage 1.8–9 handwrite turn in 6.1 handwrite 2.7 read the e-text 2.7 interactive video 2.7 practice quiz begin problem set 3
4/3– 4/5	2.7 handwrite, activities	re-engage 6.1 handwrite turn in 2.7 handwrite card sort 3 review 3 practice quiz	group review 3 t-shirt Wednesday	re-engage 2.7 handwrite debrief 1.8, 1.9, 6.1, 2.7 problem set 3
4/10– 4/12	group debrief 3 module 4 overview	re-engage problem set 3 3.1–3.3 read the e-text 3.1–3.3 interactive video 3.1–3.3 practice quiz	3.1–3.3 handwrite, activities t-shirt Wednesday	turn in 3.1–3.3 handwrite 5.1–5.2 read the e-text 5.1–5.2 interactive video 5.1–5.2 practice quiz final project video begin final project
4/17– 4/19	5.1–5.2 handwrite, activities	re-engage 3.1–3.3 hand turn in 5.1–5.2 handwrite 5.6 read the e-text 5.6 interactive video 5.6 practice quiz begin problem set 4	5.6 handwrite, activities t-shirt Wednesday	re-engage 5.1–5.2 hand turn in 5.6 handwrite card sort 4 review 4 practice quiz begin study guide
4/24– 4/26	group review 4	re-engage 5.6 handwrite debrief 3.1–3.3, 5.1–5.2, 5.6 problem set 4	group debrief 4 t-shirt Wednesday	re-engage problem set 4 glossary 2 prepare for assessment complete open items
5/1– 5/3	in-class assessment 2	course survey course evaluation work on final project	share final project ideas last day of classes t-shirt Wednesday	work on final project
5/10	by 11am: turn in video presentation in ASULearn assignment by the beginning of our assigned time during finals 11-1:30 during the assigned time, conduct final project peer review and self-evaluation (optional) revise and reflect on one in-class assessment, one of the problem sets			