1. In class quizzes. Quiz Questions and Attendance Checks: how they will be handled. Make sure you have your polleverywhere app ready. **Polleverywhere link for in class quizzes**: https://pollev.com/yuanandiao611/. It can be accessed from the Canvas homepage or from the Syllabus file.

2. First kind of Homework Assignments: from your textbook (ZyBook assignments). They are auto graded but the scores have to be manually transferred to your Canvas grade book by the instructor, so expect some delay. This is usually updated once or twice each week.

3. Second kind of Homework Assignments: through WebWork. Graded and is an important portion of your overall grade.

4. Tests and final exam: will be given in the form of Canvas Quiz. A sample test will be provided prior to the first test.

5. Grading and the grade book in Canvas.

6. Navigating through the Canvas page and managing your time and tasks:

• All the information that you need for this course can be retrieved from the homepage, the assignment menu, etc.

• Lecture notes are always posted after class, usually within a few hours after each class.

• Answers to in class quiz questions are always marked in the posted lecture notes.

7. Office hours are from 10:30am to noon on Tuesdays and Thursdays. You can either meet me in person in my office, or you can meet me online via Zoom, whichever is more convenient to you. Occasional additional online office hours can be scheduled by appointments/requests.

8. Other questions concerning the class?

Quiz Question 1. Choose the correct statement from the following.

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A. In class quizzes are not important and you don't have to do them;

B. You can only answer questions of the in class quizzes through polleverywhere;

C. In class quizzes are meant to distract you from paying attention in class;

D. I am actually not paying attention at this very moment and have no idea why I am choosing this one.

Quiz Question 2. Choose the correct statement from the following.

A. Your grade for the course is determined only by your performance on the tests and the final exam;

B. Your grade for the course is determined by the in class quizzes and WebWork homework assignments only;

C. Your grade for the course is determined only by your performance on the tests and the final exam, as well as your performance on the homework assignments and the in class quizzes/attendance checks;

D. You are totally lost and have no idea on how your grade will be determined, so you are just going to select this choice hoping for the best.

Chapter 1. System of linear equations

1.1 System of linear equations

Key points/concepts:

- What is a linear equation?
- The simplified form of a linear equation.
- What is a system of linear equations?
- What is the solution of a system of linear equations?
- The geometric interpretation of the solutions to a system of linear equations.
- How many solutions a system of linear equations can have?

Examples of non-linear equations:

$3x^2 - 5x + 7 = 0$

$\log_2(x + 1) = 5$

$\sin(2x - 3) = 0.4$

$(x - 1)^2 + (y + 4)^2 = 25$

$\frac{5}{x} - 3y = 4$

$\sqrt{x + 1} = 4$

$7x_1 + 2x_2 - 4x_1x_3 = 5$

Examples of linear equations:

$2x + 5 = 0$

$2x - 3y = 6$

$3x - 5y + z = 7$

$2x_1 + 4x_2 - 5x_3 + x_4 = 2$

$2x_1 - \sqrt{17}x_2 + x_3 = \sqrt{2}$

$2(x_1 - 2x_2 + 5x_3) + 8(2x_1 + 4(x_5 + x_7)) = 7$

Basic rule: we can have any number of unknown variables in a linear equation, but each variable can only be multiplied by a constant number.

• What is a system of linear equations?

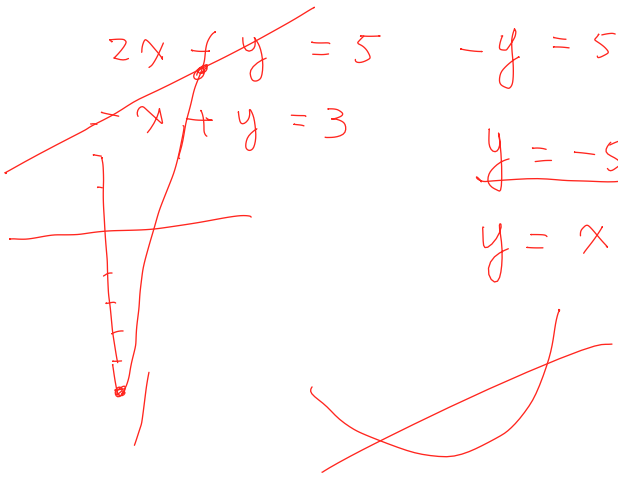
A system of linear equation consists of several linear equations. A solution to a linear equation system is a solution to each of the linear equations in the system.

For example,

$$3 \cdot 1 + 0 - 5(-1) = 3 + 5 = 8 = 8$$

$$\begin{aligned} 3x_1 + x_2 - 5x_3 &= 8 \\ 2x_1 - 2x_2 + 4x_3 &= -2 \\ x_1 \qquad + 5x_3 &= -4 \end{aligned}$$

is a linear equation system and $x_1 = 1$, $x_2 = 0$, $x_3 = -1$ is a solution to the system since it is a solution to each equation in the system.



$-y = 5 - 2x$

$y = -5 + 2x = 2x - 5$

$y = x + 3$

• The geometric interpretation of the solutions to a system of linear equations.

The solutions to a single linear equation with 2 variables represent points on a straight line in a plane. The solutions to a system of linear equations must be solutions to each of these equations. Thus in the case of a system of 2 linear equations with 2 variables, the solutions represent points that are on both straight lines, namely the intersection points of these two straight lines. Refer to the textbook for illustrations and more examples.

1.2 Matrices and linear systems

$$\begin{aligned} 3x_1 + x_2 - 5x_3 \qquad\quad - 12x_6 &= 12 \\ 2x_1 - 2x_2 + 4x_3 - 5x_4 \qquad + 8x_6 &= 23 \\ x_1 \qquad - 7x_3 + 4x_4 - x_5 + 9x_6 &= -1 \end{aligned}$$

$$\left[\begin{array}{cccccc|c} 3 & 1 & -5 & 0 & 0 & -12 & 12 \\ 2 & -2 & 4 & -5 & 0 & 8 & 23 \\ 1 & 0 & -7 & 4 & -1 & 9 & -1 \end{array}\right]$$

A 3×7

augmented matrix

- Matrix size (dimension), notation, row, column, transpose etc.

$\begin{bmatrix} 1 & 4 \\ 6 & 1 \\ -1 & 5 \end{bmatrix}$ size = 3×2 $B_{1\times 5}$

$\begin{bmatrix} 1 & -3 & 1 & 0 & 5 \end{bmatrix}$

$\begin{bmatrix} 1 & 4 \\ 6 & 1 \\ -1 & 5 \end{bmatrix}^T = \begin{bmatrix} 1 & 6 & -1 \\ 4 & 1 & 5 \end{bmatrix}$

$A_{3\times 4}$ then $A^T_{4\times 3}$

Quiz Question 3. What is the size of the matrix below?

$$\begin{bmatrix} -1 & 1 & 0 & 0 \\ 2 & 6 & 9 & -3 \\ 0 & 0 & 0 & 0 \end{bmatrix}$$

A. 4×2;

B. 4×3;

C. 3×4;

D. 2×4.

Quiz Question 4. Consider the following system of linear equations:

$$\begin{aligned} x_1 - 3x_2 \qquad - 5x_4 &= 2 \\ 2x_1 + 3x_2 - 7x_3 + x_4 &= -3 \end{aligned}$$

Let the following matrix be its augmented matrix

$$\left[\begin{array}{cccc|c} 1 & -3 & a & b & 2 \\ c & 3 & -7 & d & -3 \end{array}\right]$$

Which of the following is NOT correct?

A. $a = -5$

B. $b = -5$

C. $c = 2$

D. $d = 1$