Message from Beth:

- *Before class on Thursday,* read the documents posted under Writing Assignments and Materials on the ENGR 12 shared CourseWeb page

ENGR 0012 – Engineering Problem Solving

Welcome to ENGR 0012!

Goals for today:

- Introduce the course
- Use flowcharts to visualize problems

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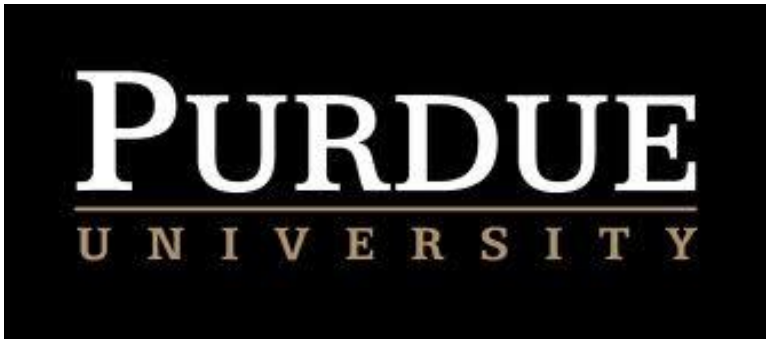


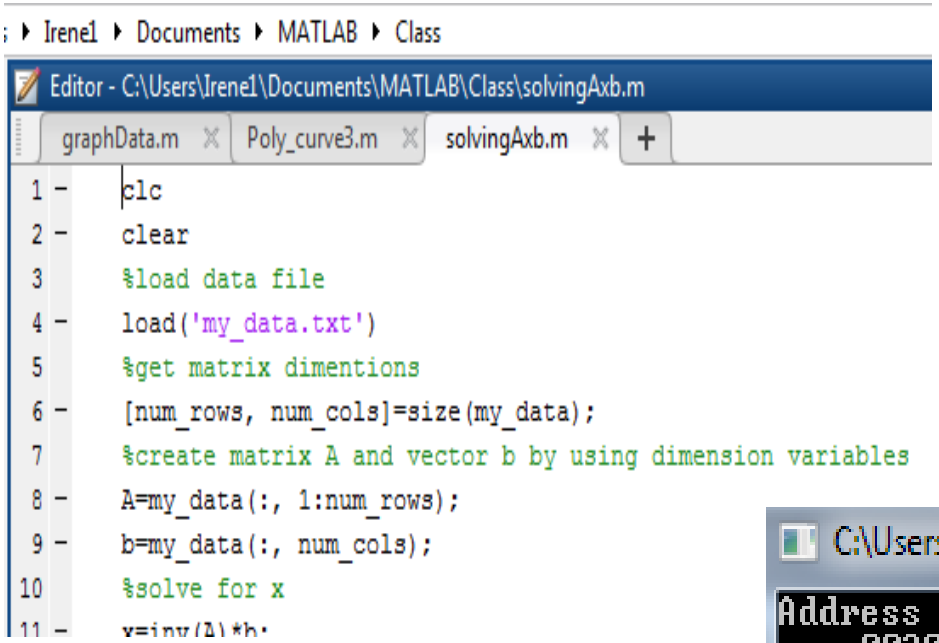
Our TAs!

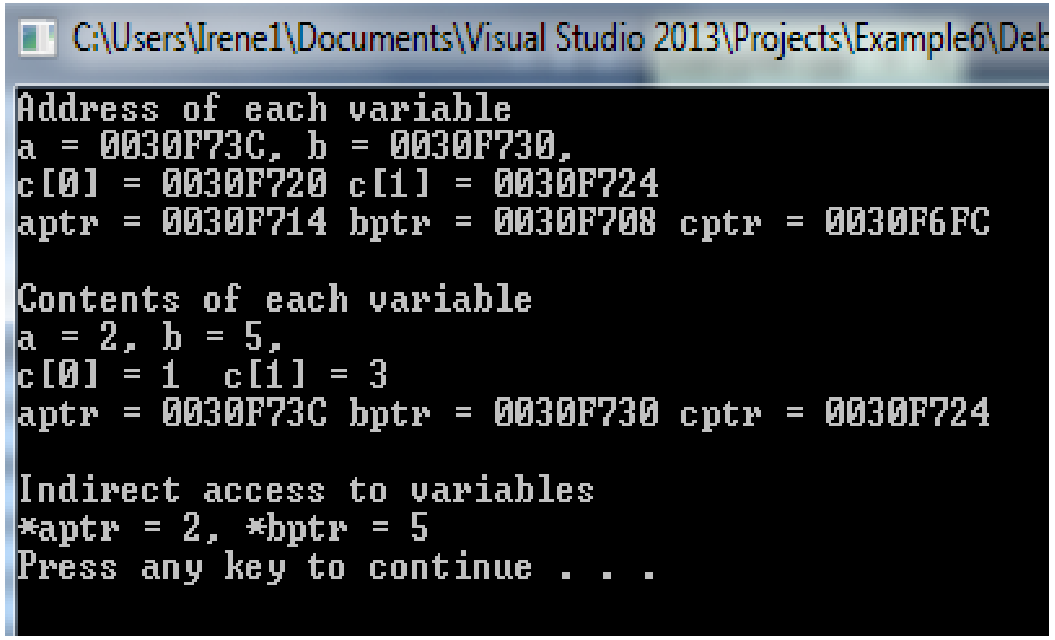
I’d like to get to know you, too!

- So, your first assignment is to complete an Intro Assignment, due next Tuesday (January 15)
  - Submit a document (via CourseWeb) with a picture of you, what you would like to be called, and something about you
  - Name the file Intro_YourName

In ENGR 12, we will learn about programming and how to use it to solve engineering problems

We will be using MATLAB and C++





You will have two CourseWeb sites for this course

- One common to all ENGR 12 sections
- One for your particular section

Let’s take a look!

The shared ENGR 12 CourseWeb site has the following information:

- Course syllabus
- TA office hours
- Assignments
- Writing assignments
- Professional Integrity and Teamwork materials

Let’s take a look!

We will be using MATLAB and C++

Irene1 ▸ Documents ▸ MATLAB ▸ Class

Editor - C:\Users\Irene1\Documents\MATLAB\Class\solvingAxb.m

graphData.m | Poly_curve3.m | solvingAxb.m

```
1 -  clc
2 -  clear
3    %load data file
4 -  load('my_data.txt')
5    %get matrix dimentions
6 -  [num_rows, num_cols]=size(my_data);
7    %create matrix A and vector b by using dimension variables
8 -  A=my_data(:, 1:num_rows);
9 -  b=my_data(:, num_cols);
10   %solve for x
11 -  x=inv(A)*b;
```

Why would this be important and/or useful?

In your groups, identify 2 reasons

C:\Users\Irene1\Documents\Visual Studio 2013\Projects\Example6\Deb

```
Address of each variable
a = 0030F73C, b = 0030F730,
c[0] = 0030F720 c[1] = 0030F724
aptr = 0030F714 bptr = 0030F708 cptr = 0030F6FC

Contents of each variable
a = 2, b = 5,
c[0] = 1  c[1] = 3
aptr = 0030F73C bptr = 0030F730 cptr = 0030F724

Indirect access to variables
*aptr = 2, *bptr = 5
Press any key to continue . . .
```

Before starting with a programming language, we will review some basic programming concepts

- By understanding basic programming concepts, it will be easier to transition to the various languages
- We will use flowcharts to help us understand the process of programming

You are likely familiar with the concept of flowcharts

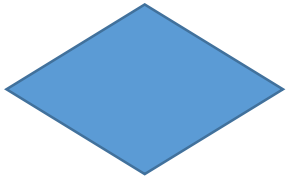
- There are many examples online

In programming, basic flowchart symbols include:

Connects symbols and shows direction of script

Represents the operations/tasks that are performed

Shows the starting and ending points



Indicates a point where a decision needs to be made

Represents inputs and outputs

Let’s start by looking at three:

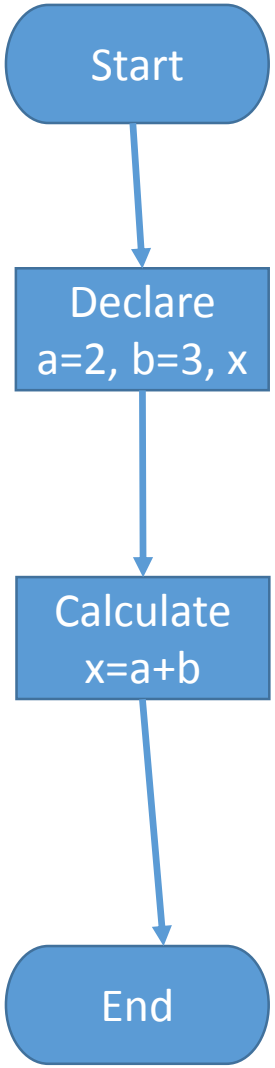
Connects symbols and shows direction of script

Represents the operations/tasks that are performed

Shows the starting and ending points

Example 1:

- We have declared a=2 and b=3
- We need to find the sum of these variables, and store them in the variable x



Five-minute break!

Image from Creative Commons - Pixabay

Our ability to succeed in this course will depend on how well you and I fulfill our responsibilities

My Responsibilities

- Come to class prepared
- Come to class on time
- Teach content in a clear, understandable manner
- Answer your questions and/or guide you to the answers
- Treat you with respect
- Grade in a timely manner
- Do my best work

Your Responsibilities

- Come to class prepared
- Come to class on time
- Be attentive and engaged in class
- Ask questions any time you need clarification
- Treat us (me and the other students) with respect
- Complete assignments in an honest manner
- Submit assignments on time
- Do your best work

We take academic integrity seriously!

- In spite of discussing the importance of integrity throughout last semester, we dealt with many academic integrity violations

For example:

- Student copying homework from another student
  - Both students received a zero on the HW
- Students cheating during a group quiz
  - All students in the group received a zero on the quiz
- Students cheating on one of the projects
  - All students in the group, and student who shared file, received a zero on the project
- Student cheating during the computer final exam
  - Student received a zero on the computer exam

ALL students in these scenarios received these consequences:

- Zero on the assessment
- Zero on the portion of the grade related to integrity
- An indication of the violation on their SSOE record
- A notification of their actions to their department of choice, to be sent once their major is declared

Note that more severe consequences will be the result of a second violation

To demonstrate professional behavior, consider:

- Am I attentive and participating?
- Am I truly present?
  - *Don't fall asleep in class*
  - *Don't use your phones in class*
  - *Don't use computers for things other than class*
- Am I acting and behaving with integrity?

If you want to succeed in this class:

- Come to class
- Do the readings
- Do all the assignments, and completely re-do practice problems
- Ask questions

Office Hours

(in 147 Benedum Hall):

- Thursdays

  3-5pm

- Also by appointment – see link in CourseWeb

- Or just stop by!

Images from Creative Commons - Pixabay

Per course policy, your exam grades must average to a 60% to pass the class

- You will not pass the course, regardless of your other assignment grades, if your exams do not average to a 60.00%

- Many of the homework and quizzes in this course are done in teams, so this policy has been in place so that every individual can demonstrate that they have the necessary programming skills to succeed in the later courses

You might find free flowchart software available, such as:

- http://dia-installer.de
- http://pencil.evolus.vn

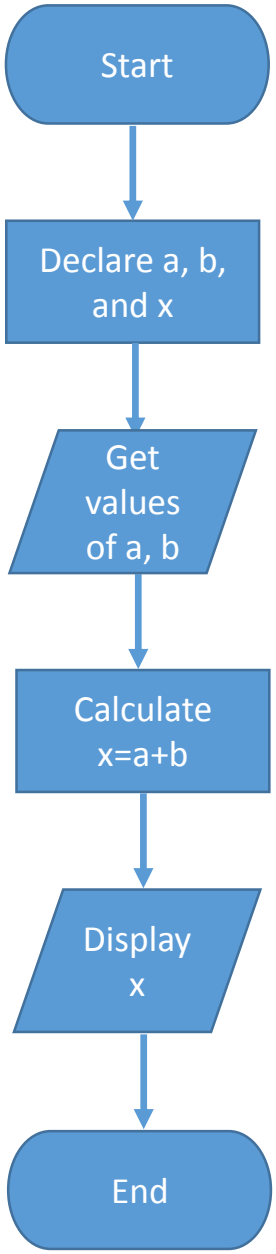
Sometimes, a program either requires information from a user, or needs to display information to the user

- Use this symbol when requesting inputs or displaying outputs:

Represents inputs and outputs

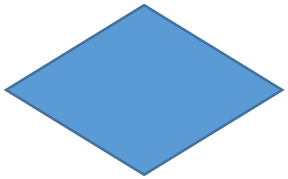
Example 1, modified

- We have variables a and b, but we need to get the values of a and b from the user
- Once the sum is calculated, we need to display the result to the user



Sometimes, a program is required to make a decision before proceeding

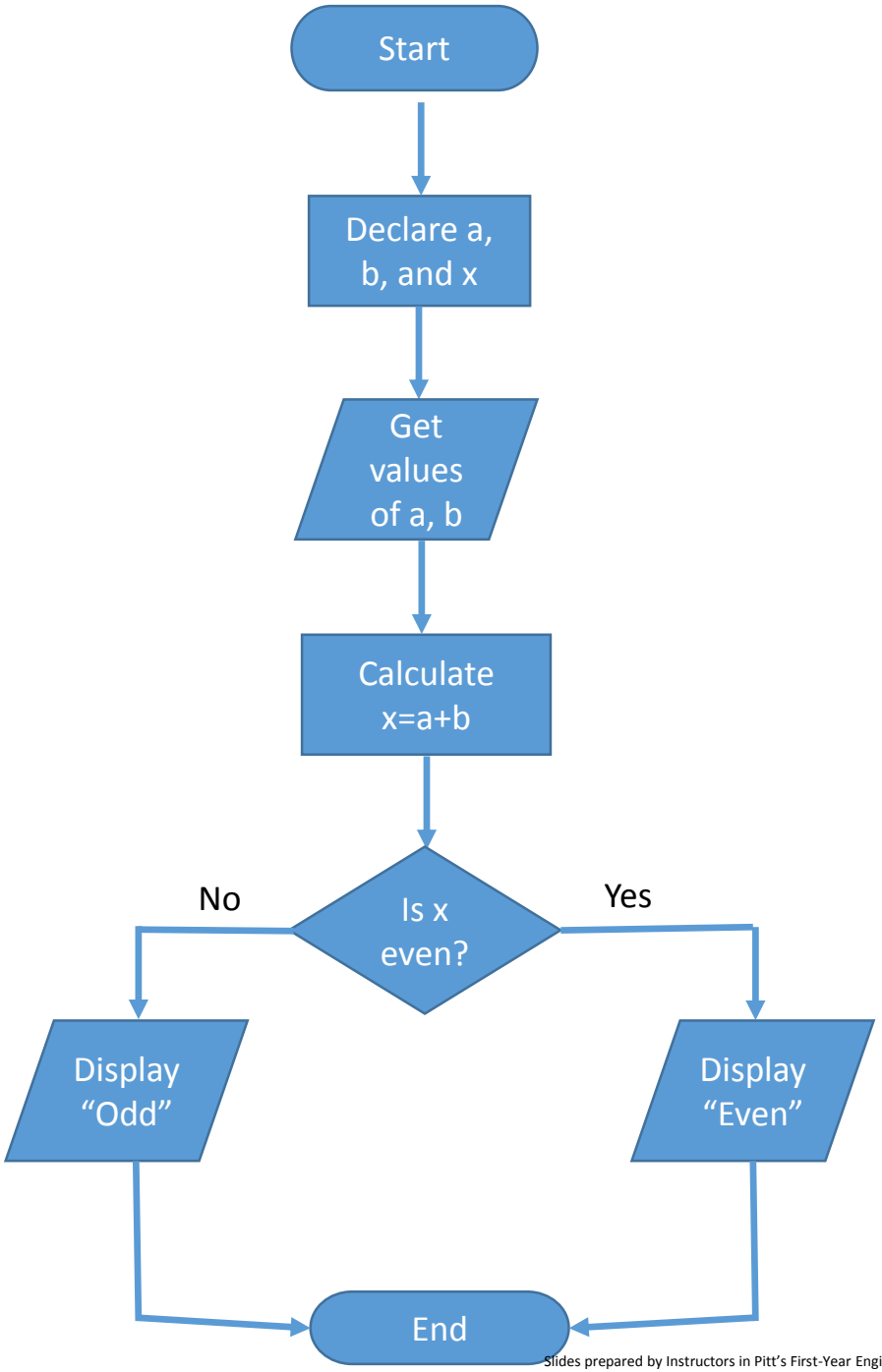
- Use this symbol whenever a decision is needed to determine next steps:



Indicates a point where a decision needs to be made

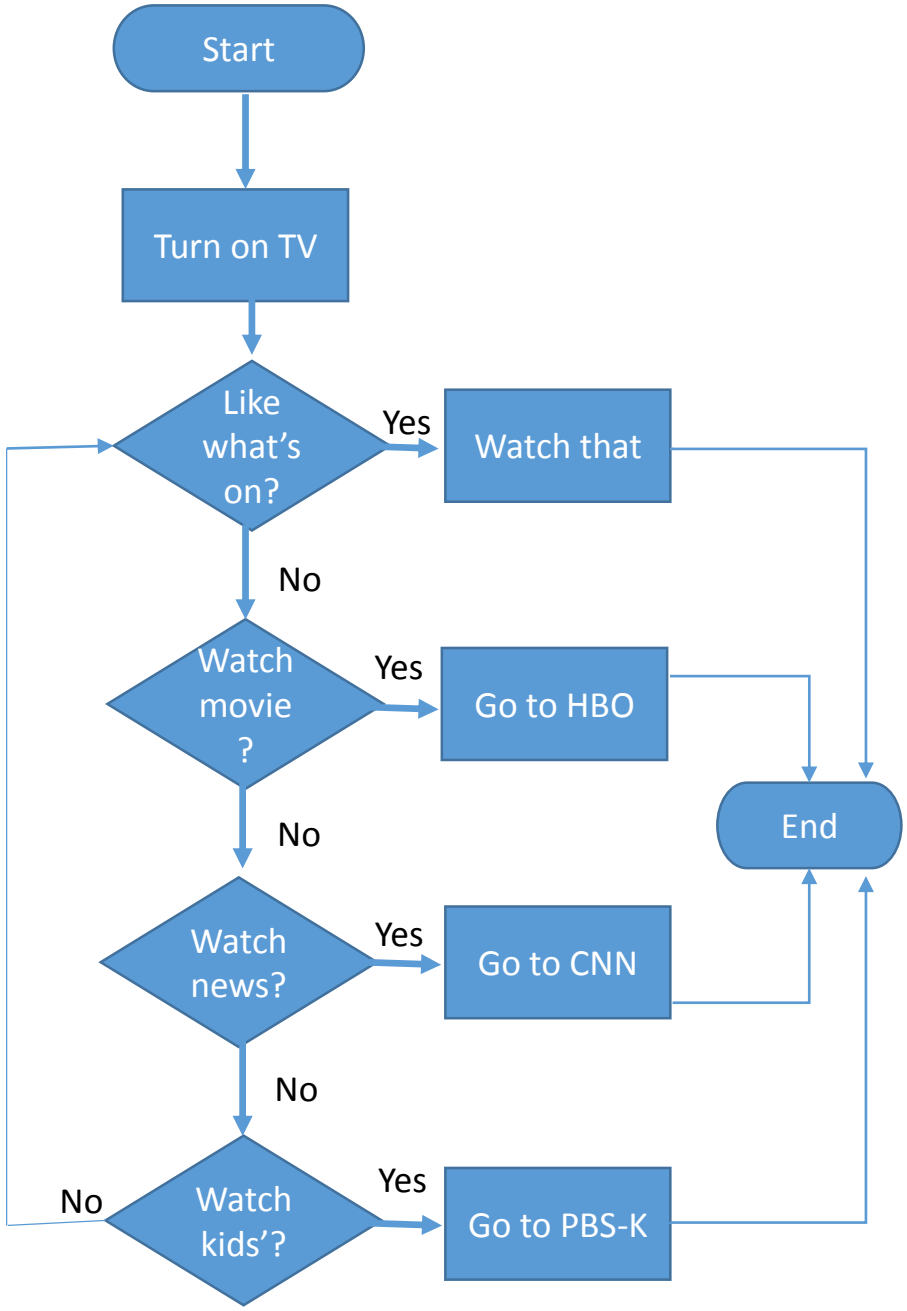
Example 1, modified

- We need to determine if the sum is even or odd, and display a message accordingly



Another example:

- You would like to watch TV
- You have the option of watching whatever is on, or watching a movie (in which case, go to HBO), the news (go to CNN), or children's show (go to PBS Kids)



Your turn!

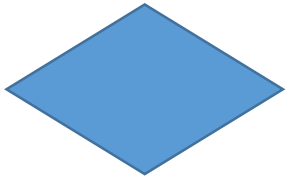
- Draw a flowchart for a program that will do the following:
  - Declare two variables (one for GPA, one for SAT)
  - Ask the user to provide the values for each
  - Determine if the user will be admitted to a certain college. To be admitted, the user needs GPA>3.92, SAT>=1350
  - Display whether the user is admitted or not admitted, based on the numbers they provided

Basic flowchart symbols include:

Connects symbols and shows direction of script

Represents the operations/tasks that are performed

Shows the starting and ending points

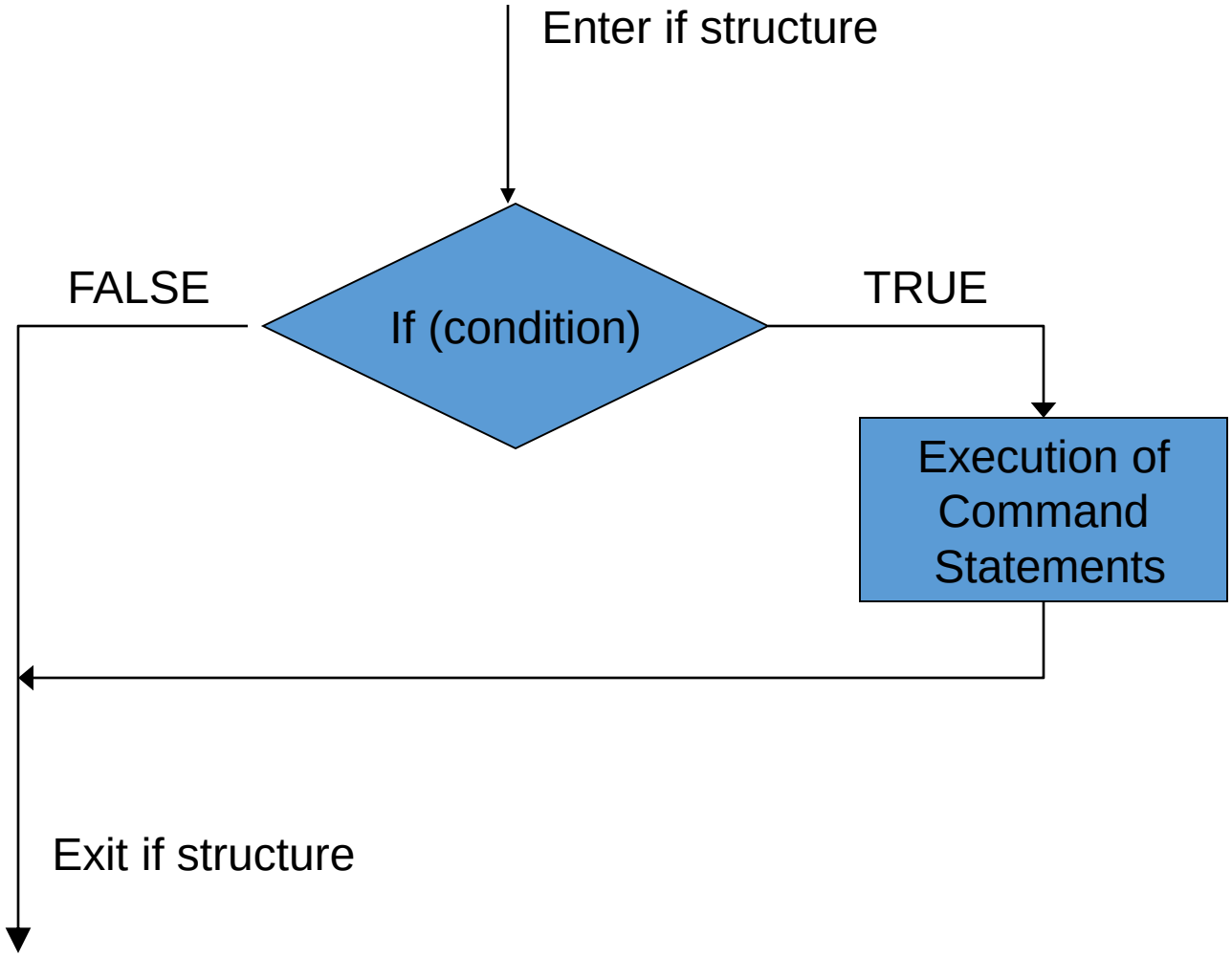


Indicates a point where a decision needs to be made

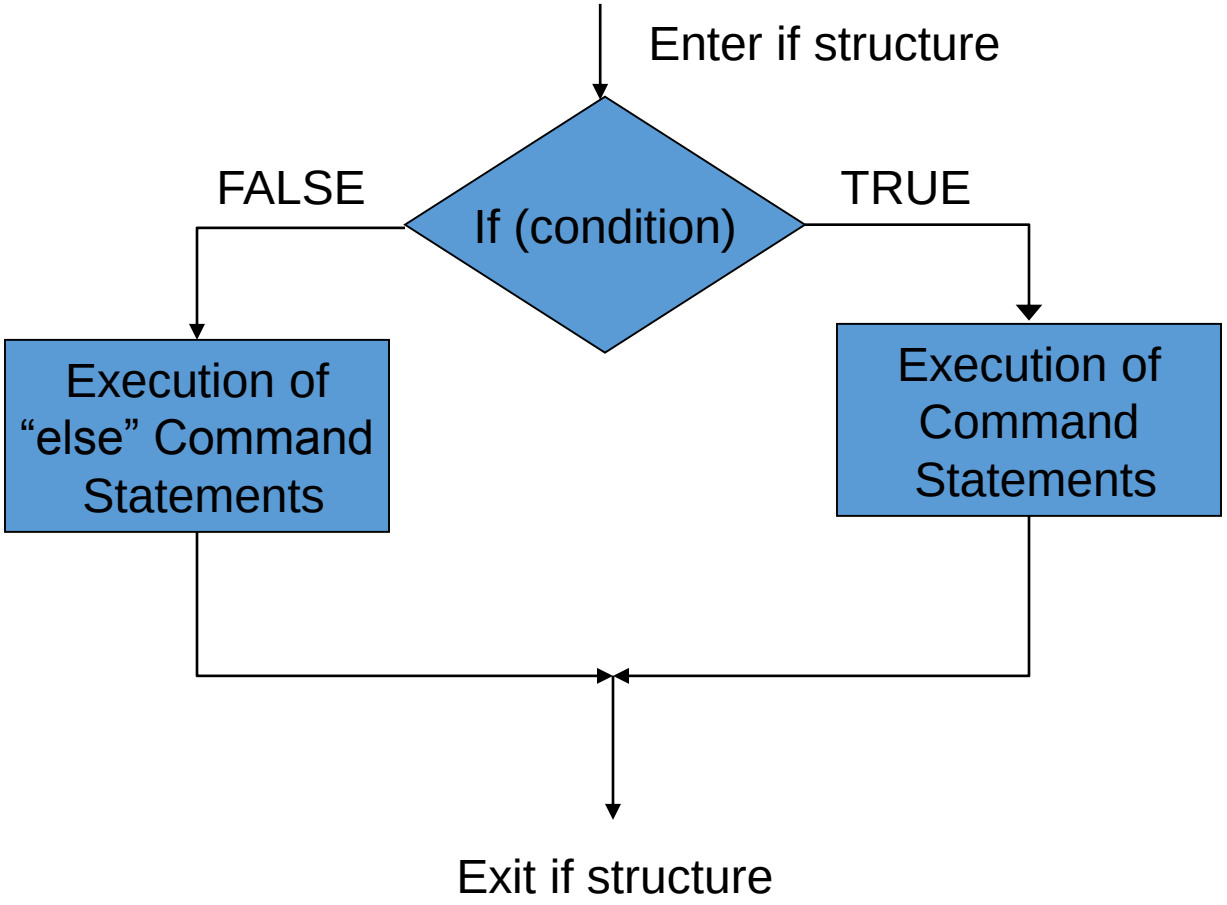
Represents inputs and outputs

We can use flowcharts to represent if statements, switch cases, for loops, and while loops

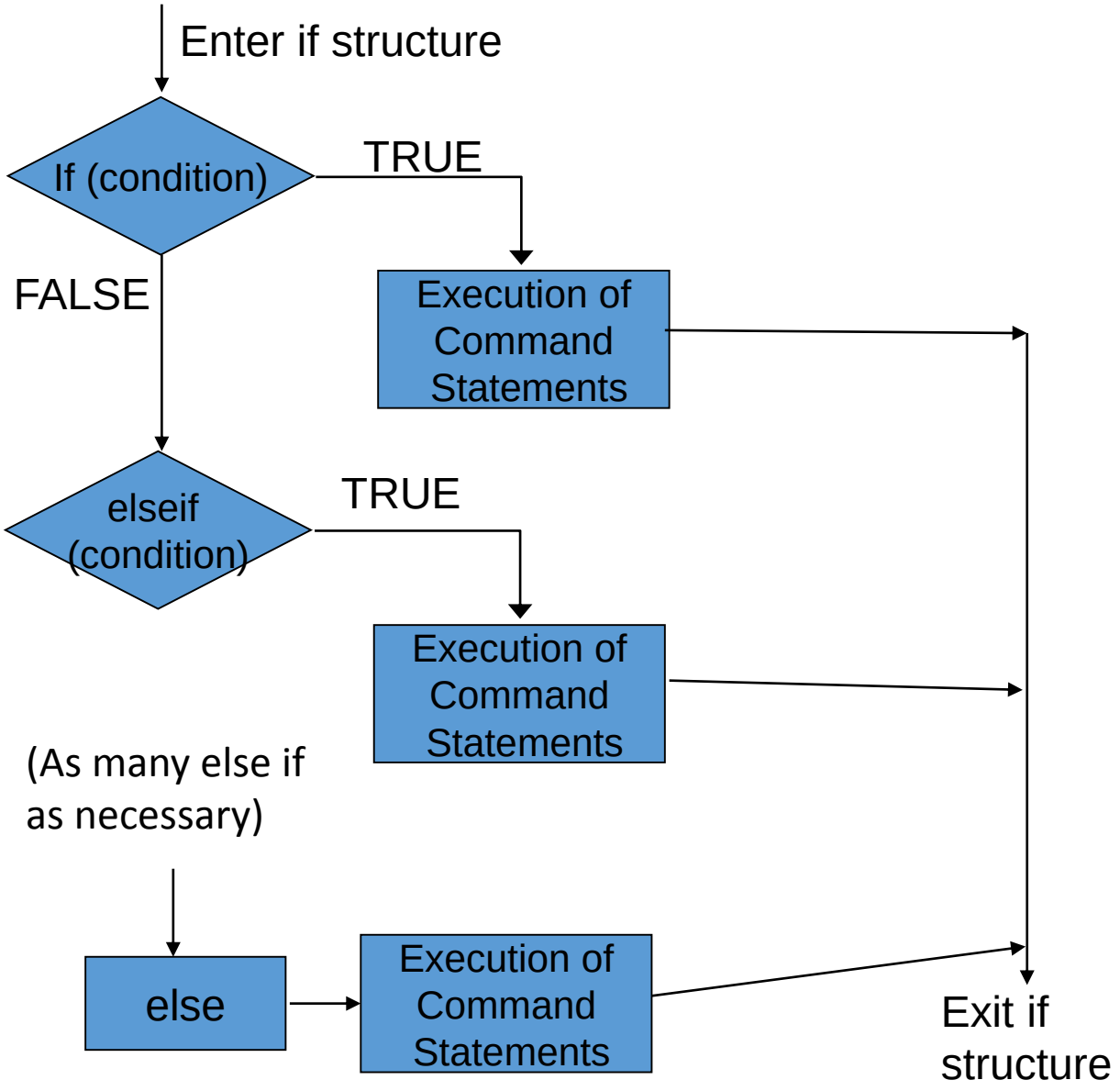
The *if statement* tests one condition



With the *if-else statement*, one condition is tested, but there are two different possible outcomes



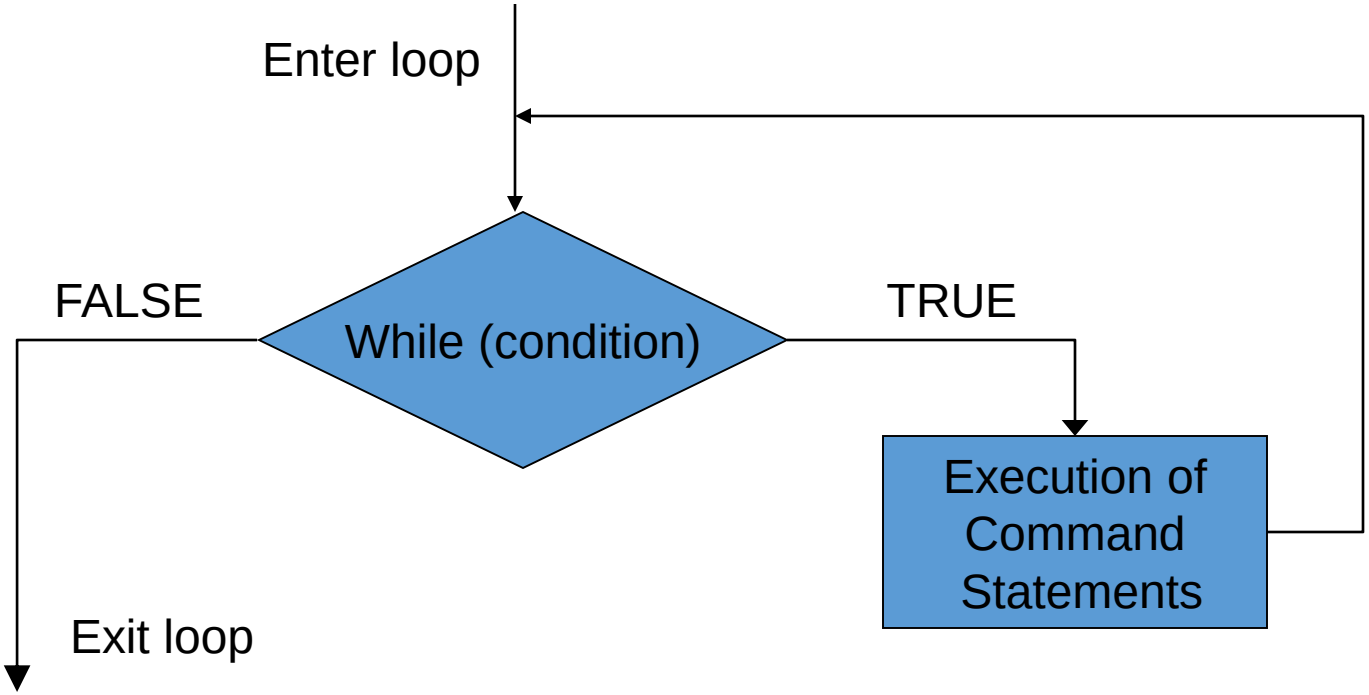
With the *if-else if statement*, multiple conditions are tested



Looping allows you to run the program a certain number of times, depending on the type you use:

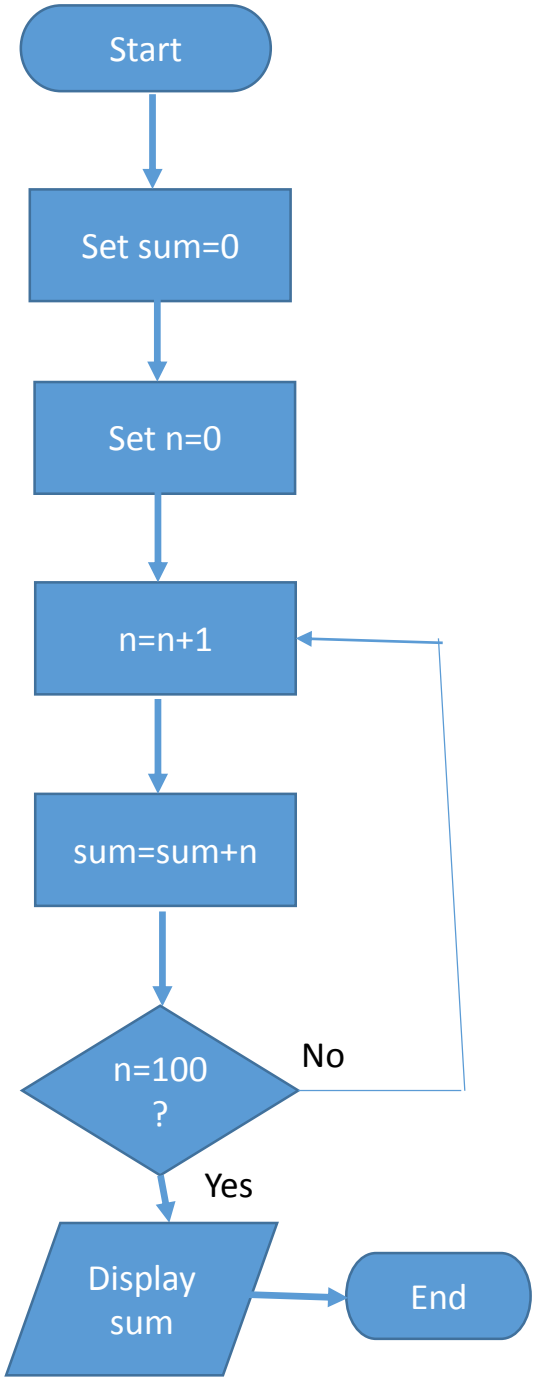
- While loop: you test a condition and run as long as the condition continues to be true
- For loop: you specify number of times

The while loop will run as long as the condition is true



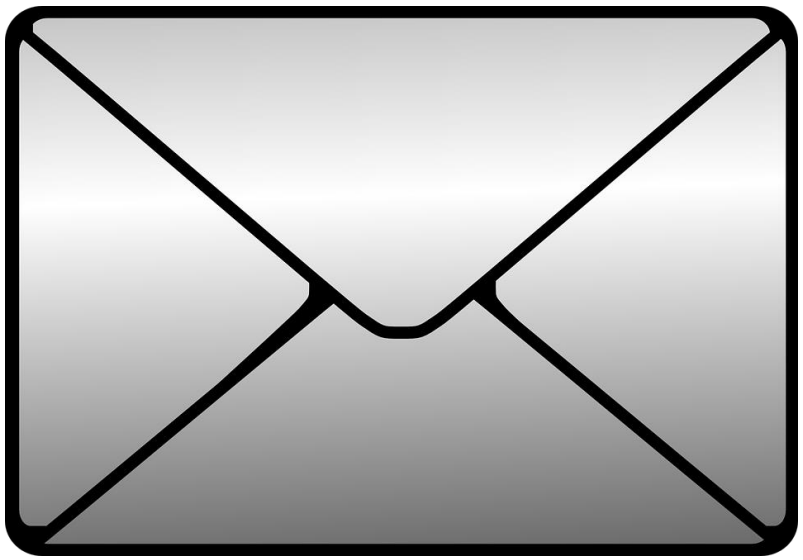
For example:

- You need to add numbers 1-100, then display final sum



Example from [1]

Some advice for you, as you start your academic careers:



- Get to know your professors
- Maintain relationships with your professors
- Become the kind of student we can wholeheartedly recommend

From “Claiming Your Right to Say No” by Amy Weldon

So, for Thursday:

- Intro Assignment
- CATME survey
- Read course syllabus
- HW1