Hi,
I am Sumaiyah

How to Survive in FAST?

- Have fruits/snacks in your bag.
- Tune in your sleep schedule.
- Do networking/rest in point. Utilize your point time.
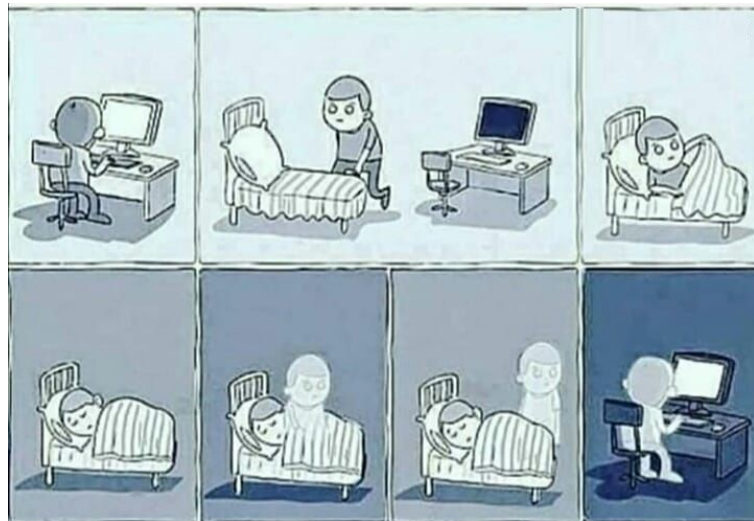- You will cry a lot here. So keep tissues with you.

How to Survive Programming Fundamental?

Don't Cheat Yourself!

I have a 0 tolerance on cheating.

3 hours of practice each day.

Marks Distribution:

```
Mid-1      :   15
Mid-2      :   15
Assignment:   10 (Three Assignments)
Quizzes    :   10 (Three Quizzes)
Final      :   50
```
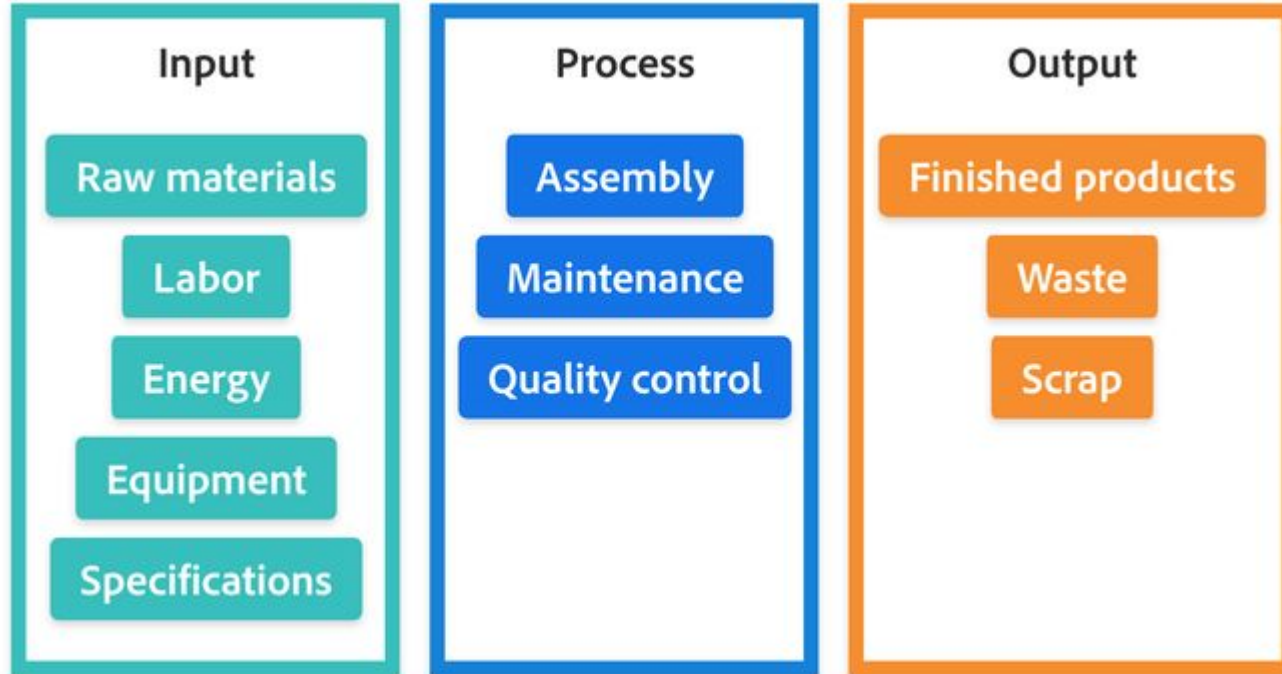
How you got admission in fast?

INPUT?
PROCESS?
OUTPUT?

IPO Chart

Input	Process	Output
Raw materials	Assembly	Finished products
Labor	Maintenance	Waste
Energy	Quality control	Scrap
Equipment		
Specifications		

Algorithm = Recipe = Instructions Set

Class Activity

Write an instructions set for driving a car.

Write an instructions set for making an origami aeroplane.

Algorithm – Making a Cup of Tea

1. Start (get ready the ingredients)
2. Put the teabag in a cup.
3. Fill the kettle with water.
4. Boil the water in the kettle.
5. Pour some of the boiled water into the cup.
6. Add milk to the cup.
7. Add sugar to the cup.
8. Stir the tea.
9. Drink the tea.
10. Stop

Algorithm VS PseudoCode

An algorithm is a step by step procedure to solve a problem.

Pseudocode is an informal way of writing a program. It represents the algorithm of the program in natural language and mathematical notations.

Pseudocode Keywords

START: This is the start of your pseudocode.

INPUT: This is data retrieved from the user through typing or through an input device.

READ / GET: This is input used when reading data from a data file.

PRINT, DISPLAY, SHOW: This will show your output to a screen or the relevant output device.

COMPUTE, CALCULATE, DETERMINE: This is used to calculate the result of an expression.
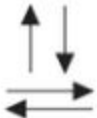
SET, INIT: To initialize values

INCREMENT, BUMP: To increase the value of a variable

DECREMENT: To reduce the value of a variable

Pseudocode ~ Fake-code

FlowChart

Flowchart Symbol	Explanation
Flowlines	Flowlines are indicated by straight lines with optional arrows to show the direction of data flow. The arrowhead is necessary when the flow direction might be in doubt. Flowlines are used to connect blocks by exiting from one and entering another.
Start / **End/Stop/Exit**	Flattened ellipses indicate the start and the end of a module. An ellipse uses the name of the module at the start. The end is indicated by the word *end* or *stop* for the top or *Control* module and the word *exit* for all other modules. A start has no flowlines entering it and only one exiting it; an end or exit has one flowline entering it but none exiting it.
Processing	The rectangle indicates a processing block, for such things as calculations, opening and closing files, and so forth. A processing block has one entrance and one exit.
I/O	The parallelogram indicates input to and output from the computer memory. An input/output (I/O) block has one entrance and only one exit.

Class Activity

Write a pseudocode and draw a flowchart for the below scenario:

You are a cashier at KFC, and your task is to manage customer orders. You will handle tasks like taking orders, calculating totals and processing payments.

Pseudocode for adding two numbers

1. Start
2. PRINT "Please enter two numbers to add"
3. READ num1
4. READ num2
5. Sum = num1+num2
6. PRINT Sum
7. End

Practice Problem

Make a simple calculator which takes 2 input numbers and do basic arithmetic operations of mathematics such as addition, subtraction, division and multiplication.

Write a pseudocode and draw IPO chart.

Problem

Write a pseudocode for a problem to read two numbers. The first number represents the unit price of a product and the second number represents the quantity of the product sold. Calculate and print the total sale.

Tasks

1. Calculating area of a circle.
2. Converting marks to percentage.
3. Bob would like to know what percentage of his income his rent is. Write a pseudocode that would calculate and print this percentage. Also draw an IPO chart and flow chart.
4. A sweater is on sale for 25% off the original price. The original price is $50. Write a solution to calculate and print the sale price.

Problem Solving Approach

Problem Solving Steps

1. Define the problem
2. Determine the root cause(s) of the problem
3. Develop potential solutions
4. Select a solution
5. Implement the solution
6. Evaluate the outcome

Problem Analysis Chart

Given Data	Required Results
Section 1: Data given in the problem or provided by the user. These can be known values or general names for data, such as price, quantity, and so forth.	Section 2: Requirements for the output reports. This includes the information needed and the format required.
Processing Required	**Solution Alternatives**
Section 3: List of processing required. This includes equations or other types of processing, such as sorting, searching, and so forth.	Section 4: List of ideas for the solution of the problem.

Figure 3.1 Problem Analysis Chart

Conditional Statements

```
IF you are happy
    THEN smile
ENDIF
```

```
IF you are happy THEN
    smile
ELSE
    frown
ENDIF
```

```
IF you are happy THEN
    smile
ELSE IF you are sad
    frown
ELSE
    keep face plain
ENDIF
```

If Else

```
1    look out the window
2    if it is raining outside
3        put on your rain boots
4        put on your raincoat
5    go outside
```

```
1    secretly pick your favorite number from 1 to 50
2    have your friend guess your favorite number
3    if your friend guesses a lower number
4        tell your friend to guess a higher number
5        go back to line 2
6    else if your friend guesses a higher number
7        tell your friend to guess a lower number
8        go back to line 2
9    else
10       tell your friend to stop guessing
```

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I/O	The parallelogram indicates input to and output from the computer memory. An input/output (I/O) block has one entrance and only one exit.
Decision	The diamond indicates a decision. It has one entrance and two and only two exits from the block. One exit is the action when the resultant is *True* and the other exit is the action when the resultant is *False*.

Class Activity

Write a pseudocode for admission process in FAST and deciding the merit criteria.

Cashier problem with the added condition either order is available or not also the amount paid is equal to the required amount or not.

Tasks

1. Make a flowchart for calculating area of a circle where radius is taken from the user.

2. Make a flowchart for converting subject marks (input from user) to percentage.
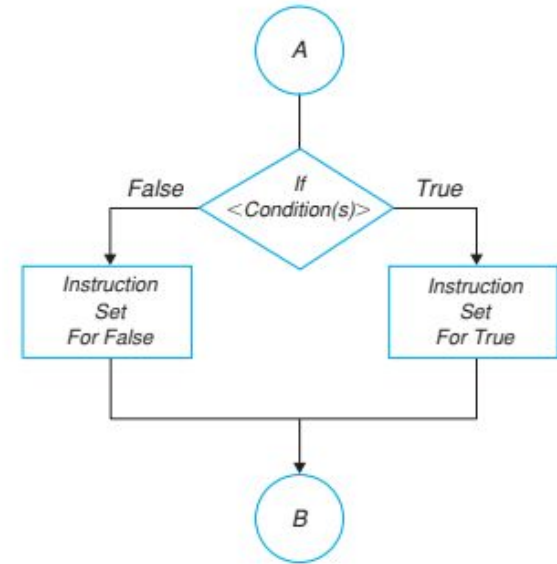
Practice Problem

Make a simple calculator which takes 2 input numbers and do basic arithmetic operations of mathematics such as addition, subtraction, division and multiplication.

Make a flowchart.

Decision Logic Structure If/Then/Else

Calculate the pay for an employee at an hourly rate of 100 Rs and overtime pay (over 40 hours) at 1.5 times the hourly rate.

Flowchart	Pseudocode

Flowchart side:

A

If Hours > 40

False → Pay = Rate * Hours

True → Pay = Rate * (40 + 1.5 * (Hours − 40))

B

Pseudocode side:

If Hours > 40 Then

    Pay = Rate * (40 + 1.5 * (Hours − 40))

Else
    Pay = Rate * Hours

Endif

Practice Problem

Ask user his/her marks in an exam, show the result pass or fail depending on the marks. Below 50 is fail.

Make a flowchart.

Practice Problem

Write a program to check whether a triangle is valid or not, when the three angles of the triangle are entered through the keyboard. A triangle is valid if the sum of all the three angles is equal to 180 degrees.

Write a pseudocode and make a flowchart.
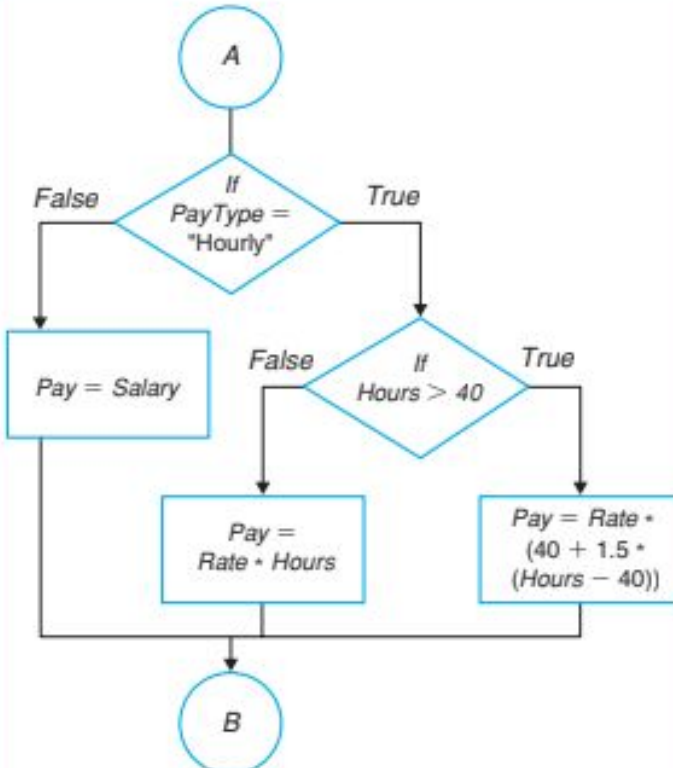
Practice Problem

Any integer is input through the keyboard. Write a program to find out whether it is an odd number or even number.

Write a pseudocode and make a flowchart.

If/Then/Else

Calculate the pay for an employee on the following conditions:

- Fixed Salary or Hourly salary
- For employees working on hourly salary, If working hours are greater than 40 hours, overtime would be paid at 1.5 times the hourly rate.

Flowchart	Pseudocode

	If PayRate = "Hourly" Then
	
	    If Hours > 40 Then
	
	        Pay = Rate · (40 + 1.5 · (Hours − 40))
	
	    Else
	        Pay = Rate · Hours
	
	    Endif
	
	Else
	    Pay = Salary
	
	Endif

Practice Problem

Make a flowchart for the charges of a train ticket based on the ages of people.

Age	Charge
Age < 16	7
Age > = 16 and Age < 65	10
Age > = 65	5

Practice Problem

Design a program for calculating a student's letter grade according to the following criteria

$$90–100 = A$$
$$80–89 = B$$
$$70–79 = C$$
$$60–69 = D$$
$$\text{below } 60 = F$$

Write a pseudocode and draw IPO chart.

Practise Exercise

1. Write the Calculation module to choose the largest number from a set of three numbers A, B, and C. Write the pseudocode and draw the flowchart.

2. Joan is planning her vacation. She is considering two different destinations. She would like to go to the one that will be less expensive for the total trip including gas, hotel room for six nights, and meals for seven days. Write a solution to tell her which of the destinations would be the less expensive.

3. Monica needs to buy a present for her best friend. She can buy it online or she can travel 30 miles to buy at the store. She is not sure which would be less expensive considering shipping and handling costs to buy online and gas costs to travel to the store. The cost is the same in both places. Write a solution to tell Monica which would be the best way to buy the present.