Mr. C loves Round Trips

ESC101: Fundamentals of Computing

Purushottam Kar

Announcements - Quiz

- Major quiz **tomorrow** – (syllabus till **Friday Aug 24**)
  - Wednesday, August 29, 2018, 12PM-12:50PM, L20 (i.e. lecture hour)
  - During lecture hours – don't be absent
  - **Bring your institute ID card** with you – will lose time if you forget
  - No minor quizzes during lab this week (August 27-August 30)
- Bring a **pencil, eraser and sharpener** with you
  - Answers to be written on question paper itself and returned back
  - If you make a mistake with pen – no extra question papers
  - If unsure, **first write answer with pencil** and **finally write it in pen**
  - We WONT HAVE EXTRA QUESTION PAPERS in case you spoil yours
  - We WONT HAVE PENCILS, ERASERS in case you forget

Announcements - Holiday

- Institute holiday next Monday (03 September, 2018)
- No lecture, no lab on that day
- Extra lecture on Saturday 08 September, 2018
  - 12 noon, L20 (same as usual)
  - Scheduled by DoAA, not by me – I like to sleep on Sat too ☹
- Extra lab for B1, B2, B3 on Saturday 08 September
  - 2PM – 5PM, New Core Labs CC-02 (same as usual)

The for loop

भारतीय प्रौद्योगिकी संस्थान कानपुर
INDIAN INSTITUTE OF TECHNOLOGY KANPUR

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General form of a for loop

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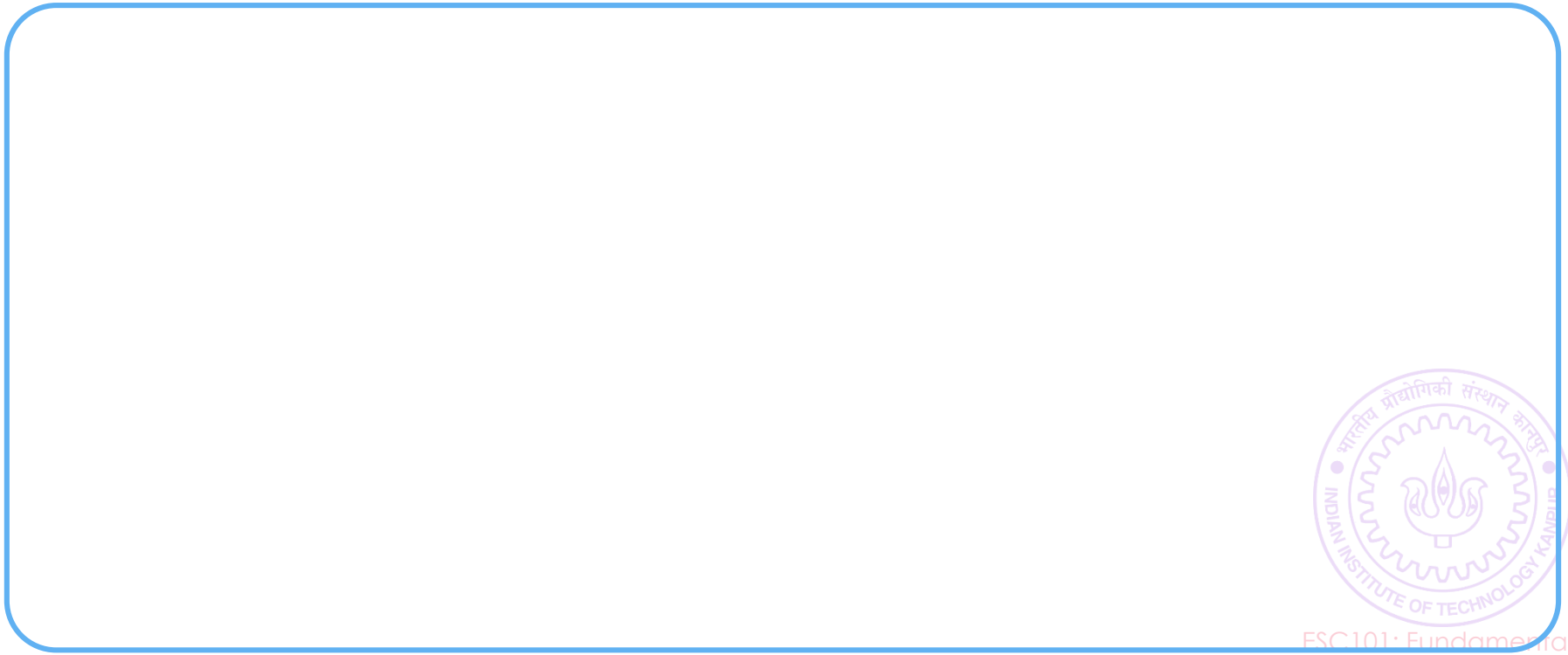

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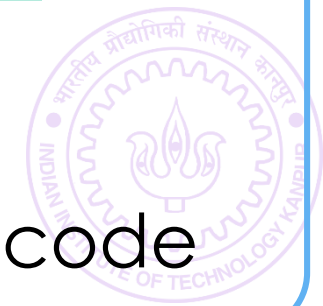

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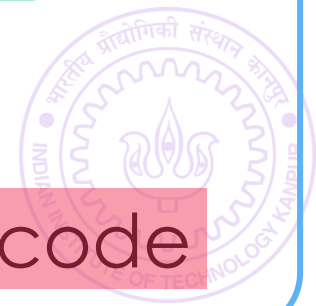

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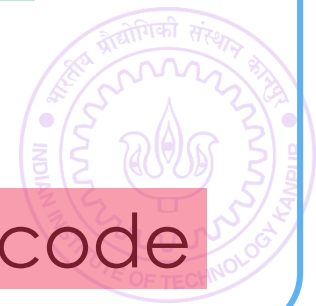

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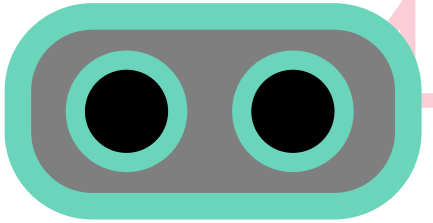

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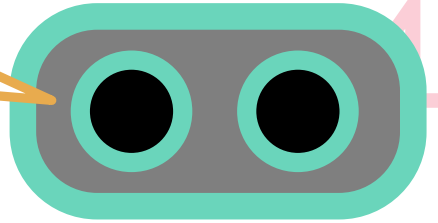

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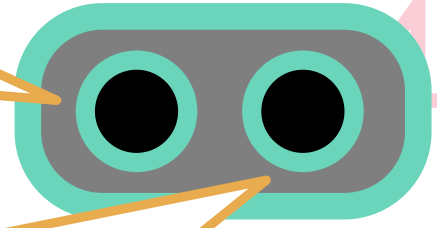

Each time I execute the statements inside the braces – called one *iteration* of the loop

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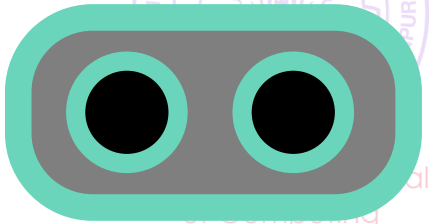

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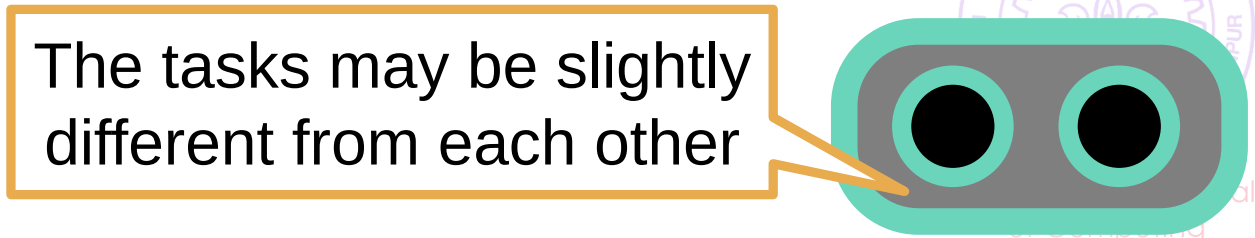

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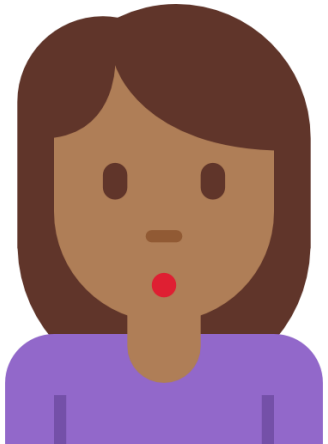

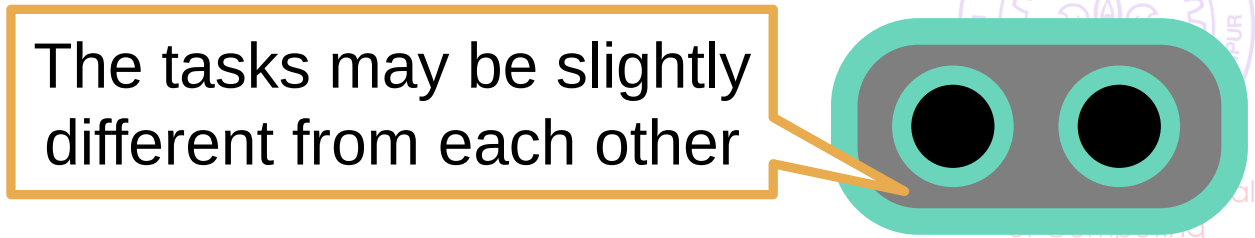

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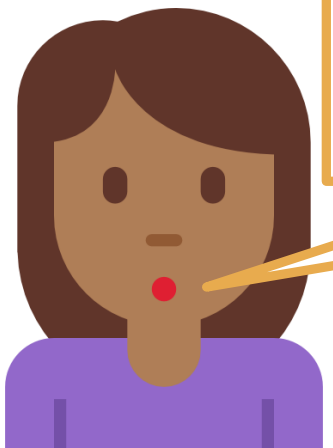

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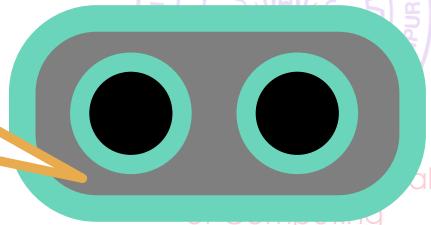
The tasks may be slightly different from each other



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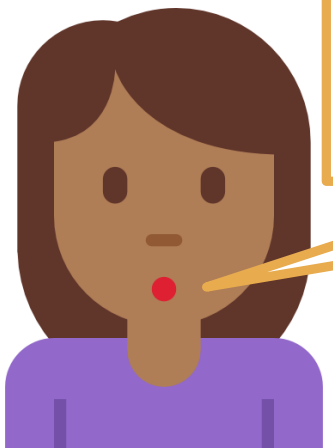

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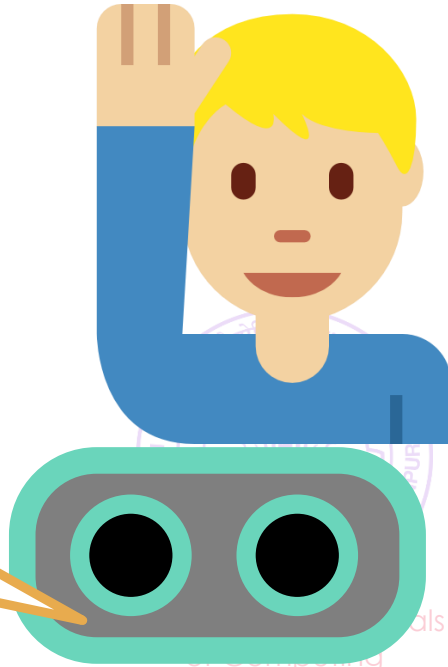

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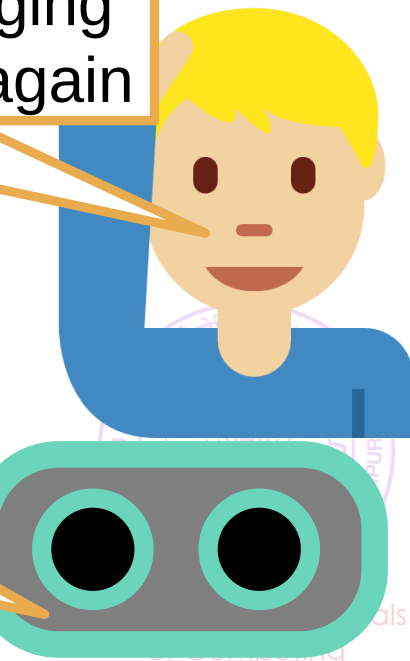
printf("%d x %d = %d\n", a, b, a*b);
to do all the tasks by simply changing the value of variable b again and again



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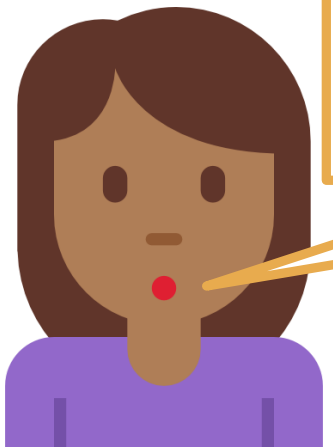

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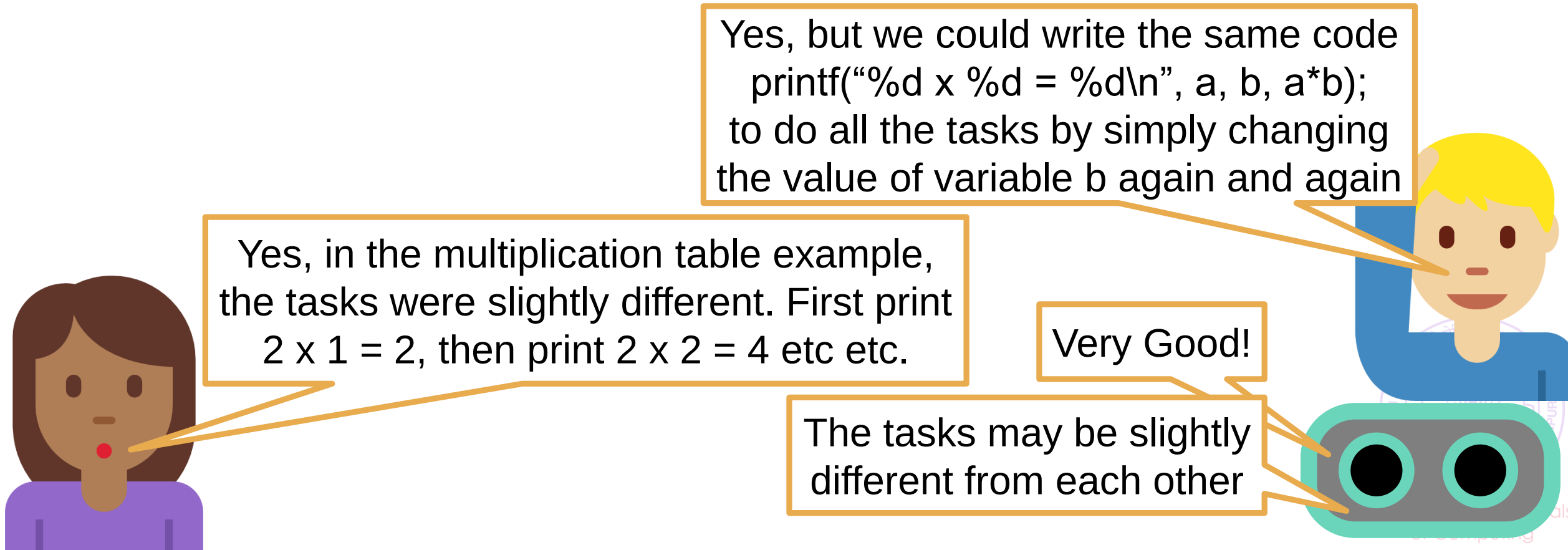

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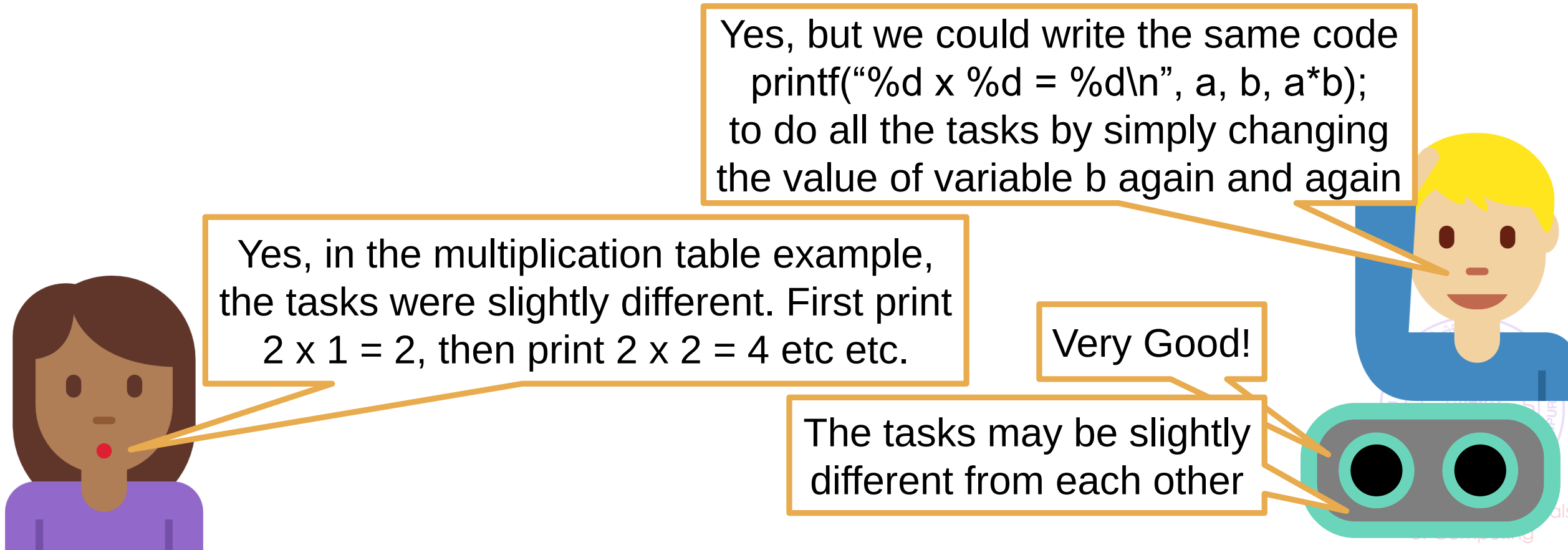
Use this variable that is changing as the variable of loop



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int a = 2, b;
for(b = 1; b <= 10; b++){
    printf("%d x %d = %d\n", a, b, a*b);
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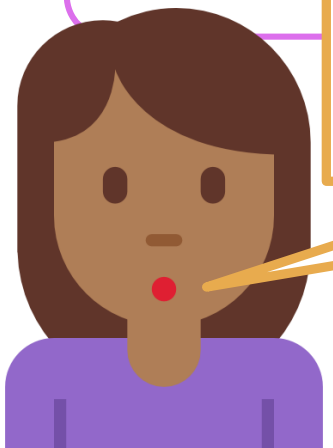

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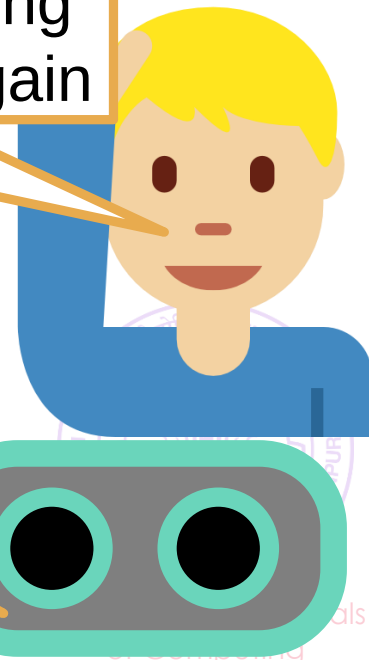

Very Good!

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Read a number then print it, then calculate the 4^{th} power of 20, then print the string "Hello World", then read another number, then add it to the first number, then print the string "Bye" and then calculate log(first number), then calculate sin(second number)

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Take n >= 1 from the user and give as output

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Given the sum of first i-1 reciprocals and add $\frac{1}{i}$ *to it*

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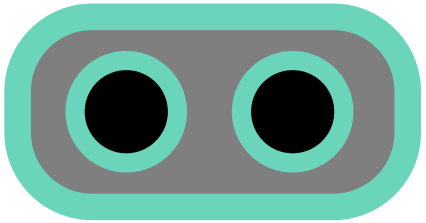

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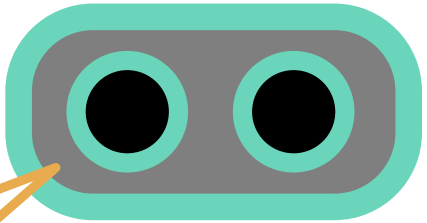

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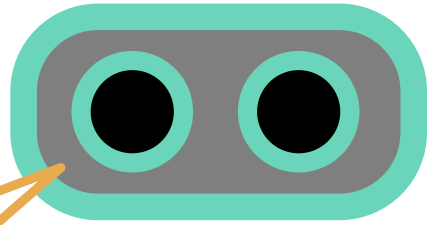

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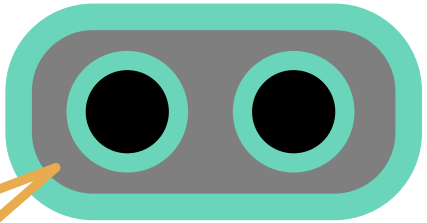
Lovingly called *partial sums* or *running sums*

Print sum of reciprocals of 1, 2 … n

Take n >= 1 from the user and give as output

$$\frac{1}{1} + \frac{1}{2} + \frac{1}{3} + \cdots + \frac{1}{n}$$



Oops! Integer division!

The repeating task can be

Given the sum of first i-1 reciprocals and add $\frac{1}{i}$ *to it*

Define a variable (lets call it **sum**) to store partial sums

The above task is accomplished by the code

```
sum = sum + 1.0/i;
```

```
sum = sum + (double)1/i;
```

Lovingly called *partial sums* or *running sums*

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Notice that in previous example

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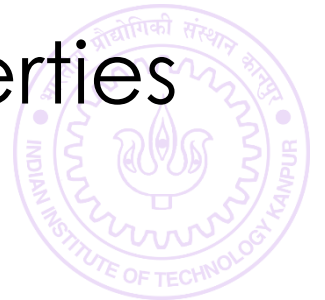

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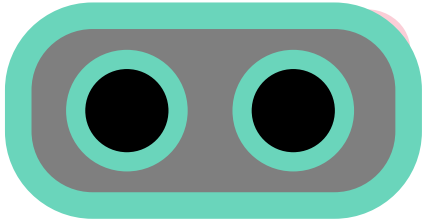

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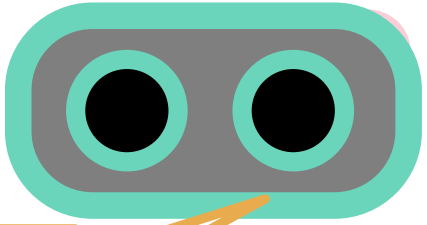

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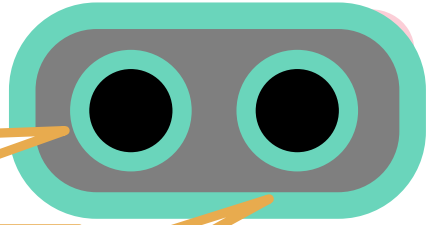

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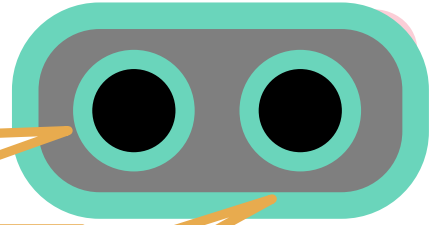

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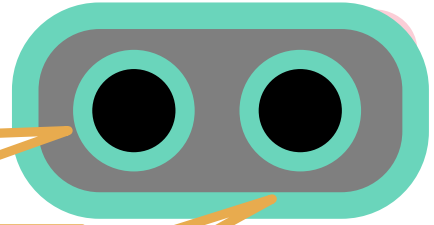

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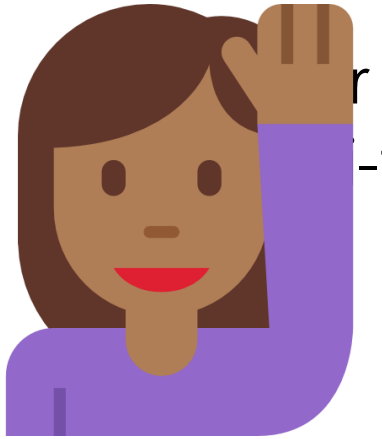

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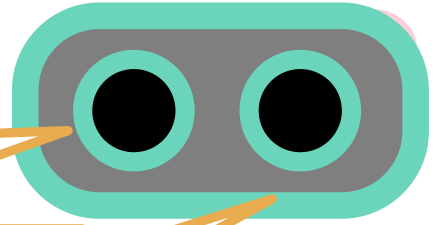

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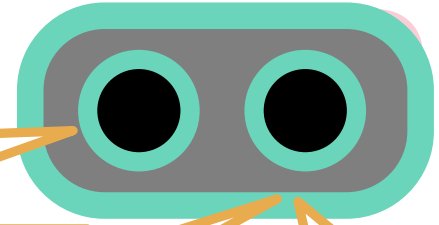

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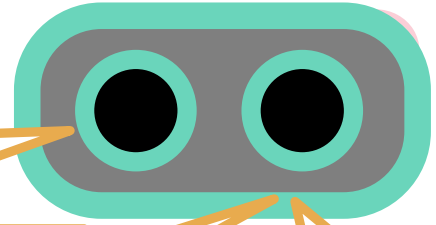

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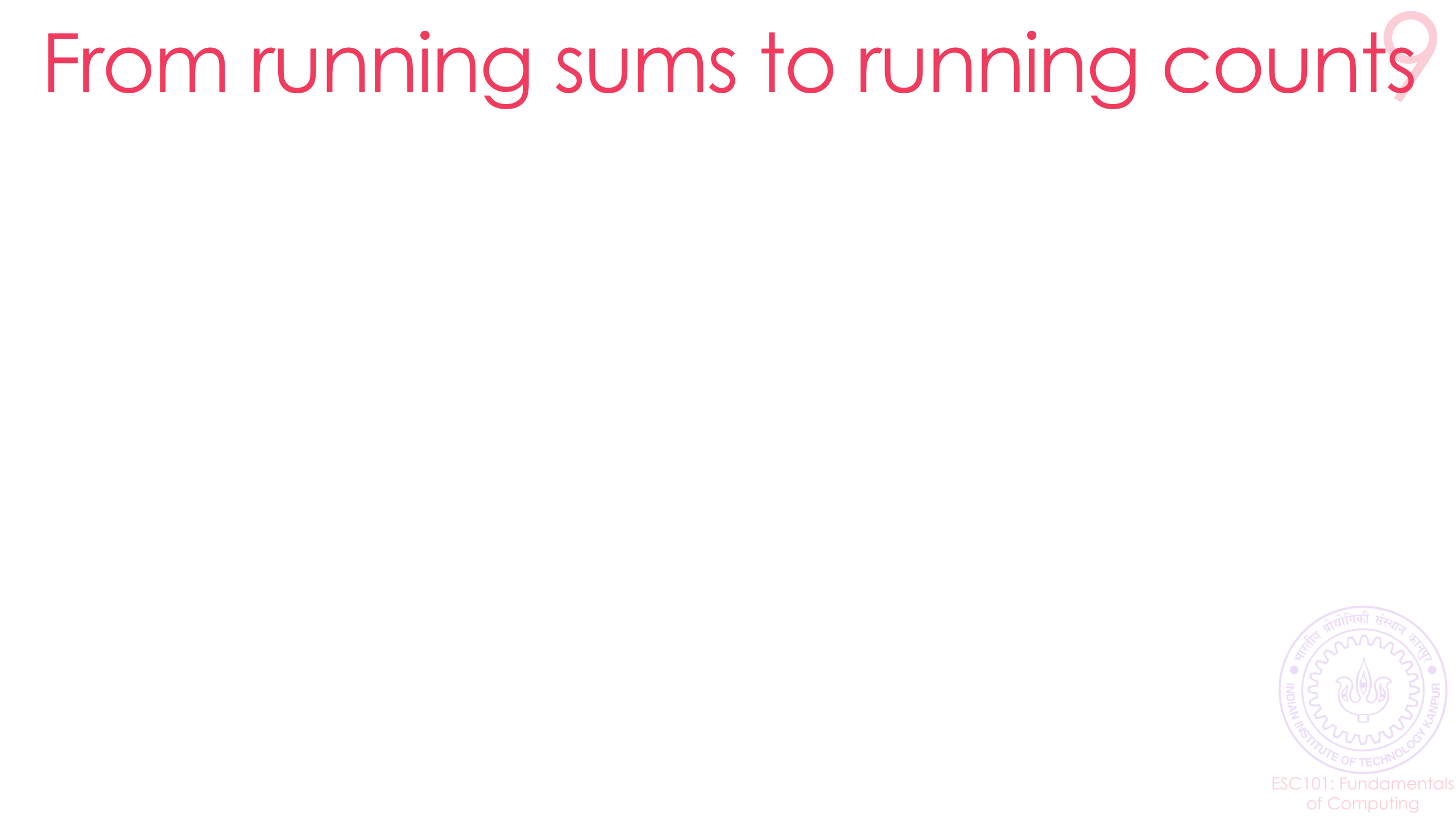
Exercise 1: sum of reciprocals of the first n even numbers
Exercise 2*: sum of reciprocals of the first n prime numbers

From running sums to running counts



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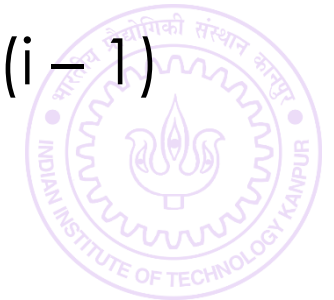

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- At the beginning of i-th iteration, count stores how many of the first (i – 1) numbers were divisible by 3 or divisible by 5
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The while loop

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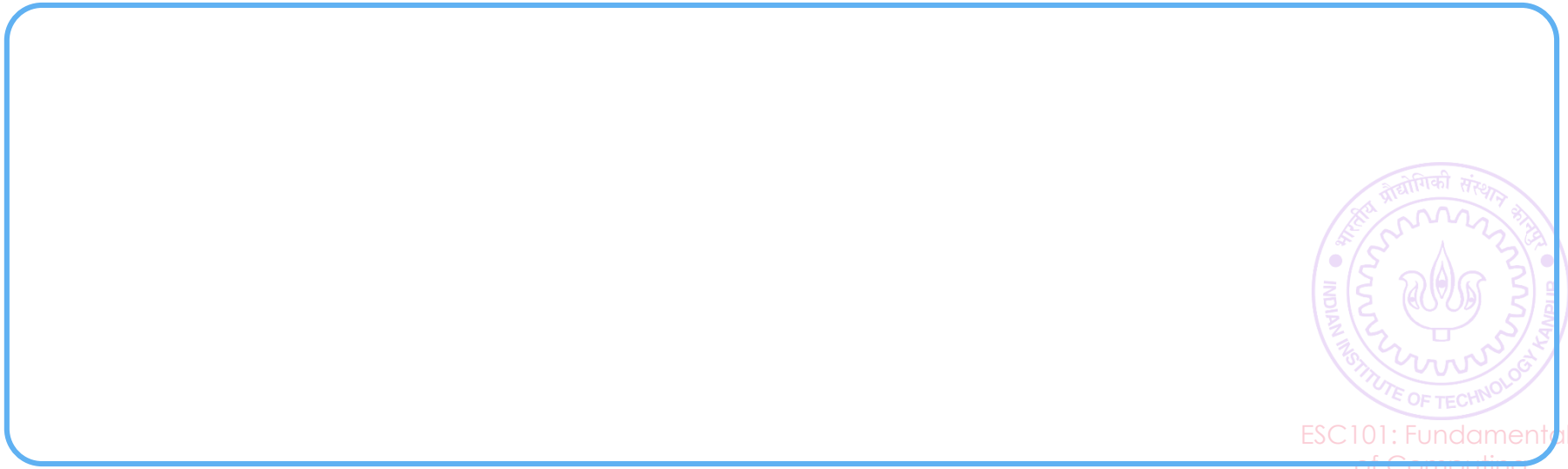

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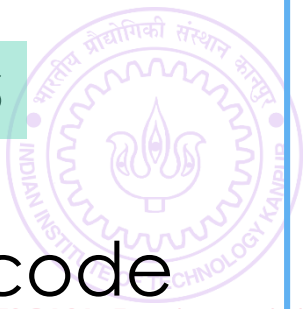

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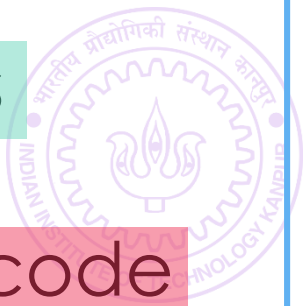

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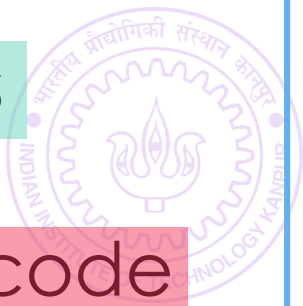

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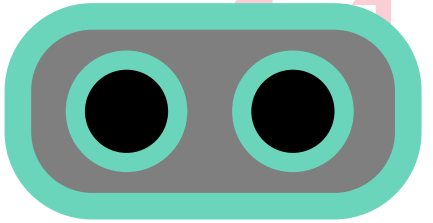

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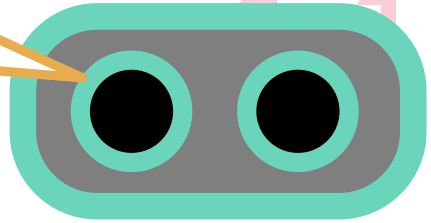

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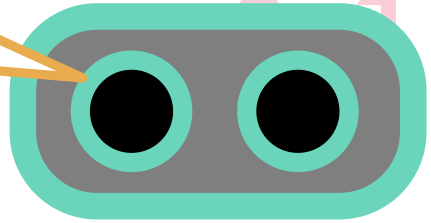

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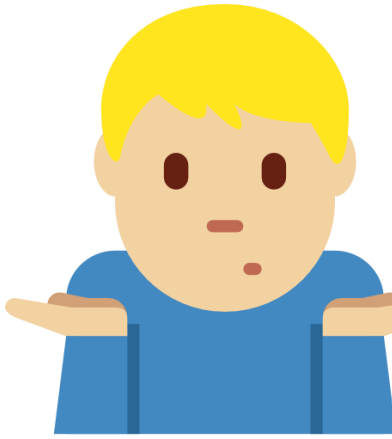

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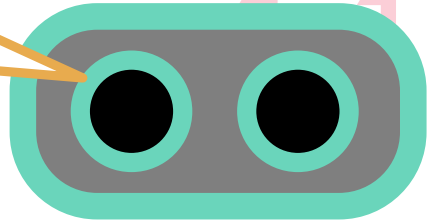
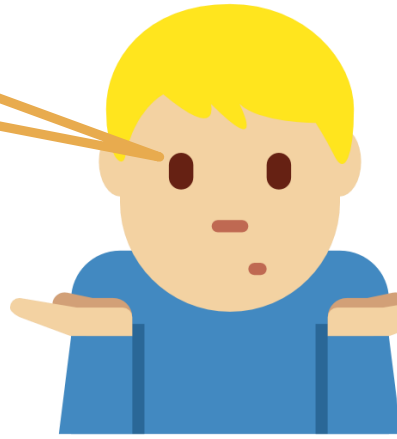


So what is the difference between for and while?



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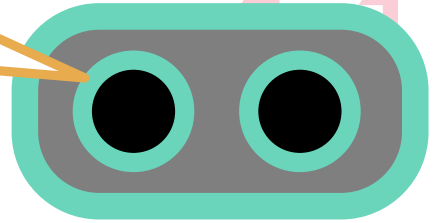
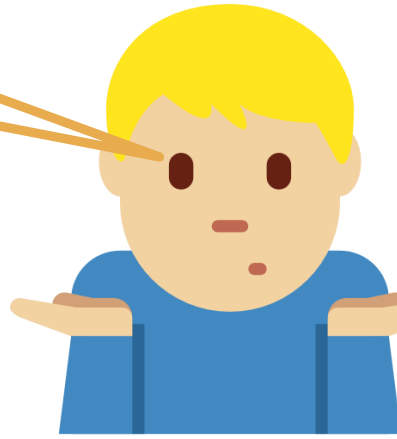


So what is the difference between for and while?



General form of a while loop

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while(stopping_expr){
    statement1;
    statement2;
    ...
}
statement3;
statement4;
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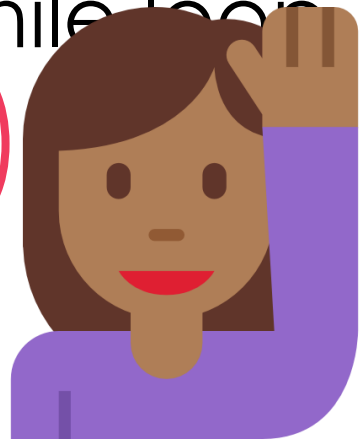

How we usually speak to a human

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2. If stopping expression is true
   - Execute all statements inside braces
   - Go back to step 2
   - Else stop looping and execute rest of code

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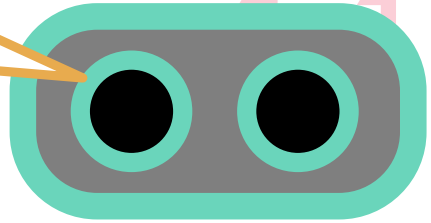

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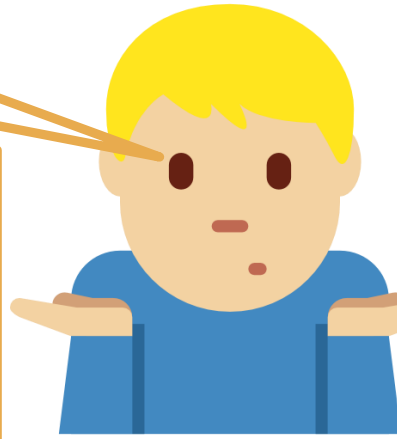

In general not much – it is a matter of style. Use while when you don't know how many iterations will loop run

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Usually if you can find a nice clear variable of loop, try using for loops

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Exercise 1: read integers till -1, print sum of all primes in the list
Exercise 2*: read integers till -1, print sum of all numbers greater than the number encountered just before that number