

# The Clones of Mr C

ESC101: Fundamentals of Computing

Purushottam Kar

# Announcements

- Last date for dropping Advanced Track October 12
  - Application must be an email to instructor, mentors, teammates
- Last date for dropping ESC101 course October 12
  - Application must be on standard DoAA course drop form – no email!
- Joint tutorial for B1 and B14 on October 12
  - 12 – 1 PM (same time), L19 - just an arrangement for this week ☺



# Clones!

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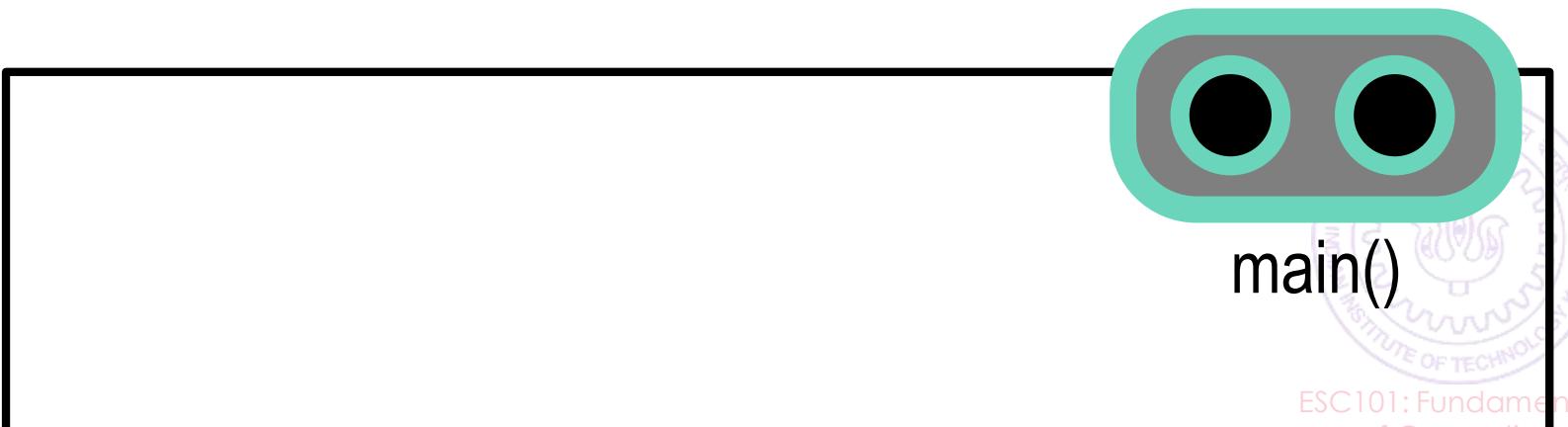
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    return a+1;  
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int sum(int a, int b){  
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int main(void){  
    int a = 2, b = 4, c;  
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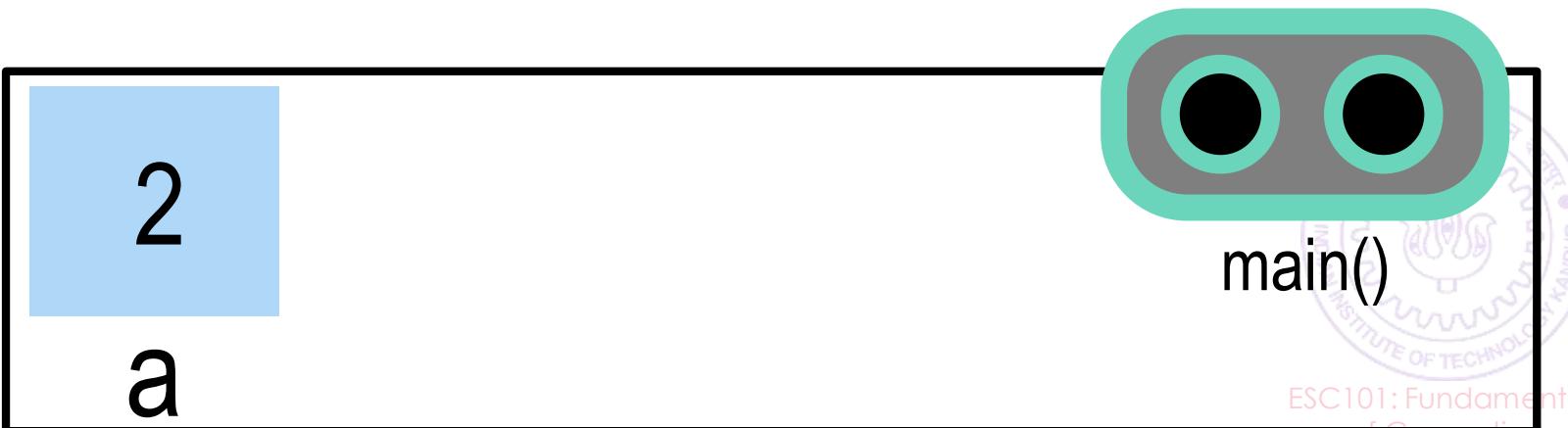
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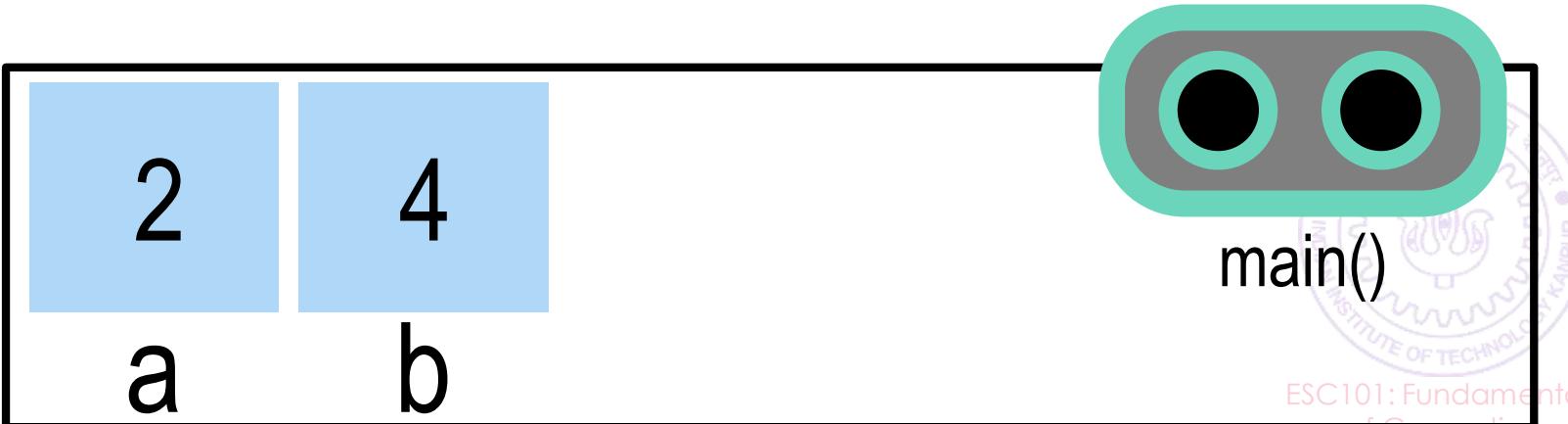
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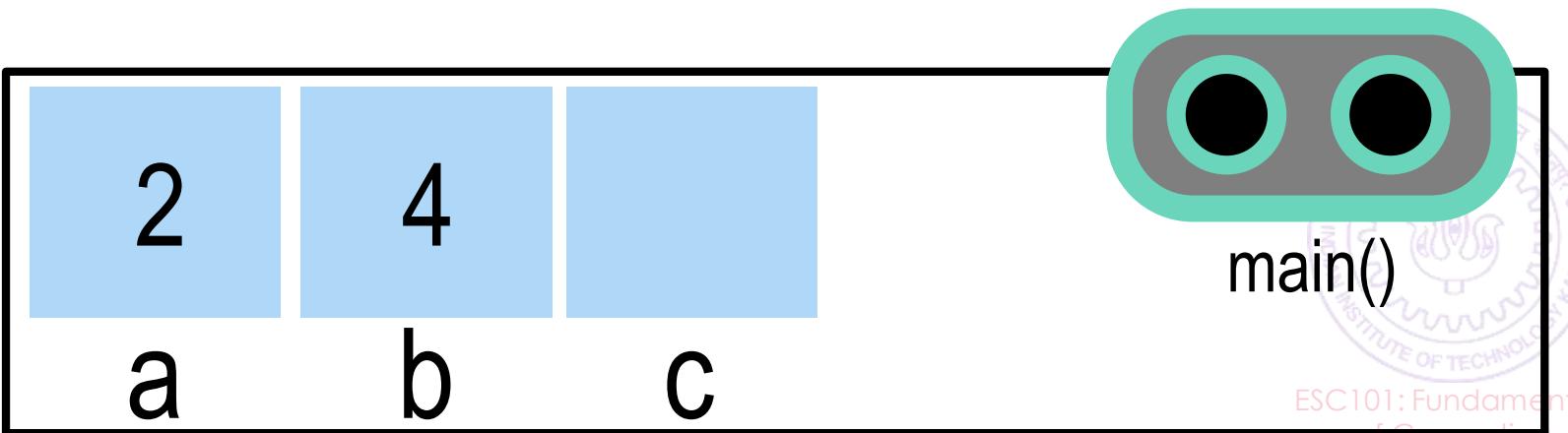
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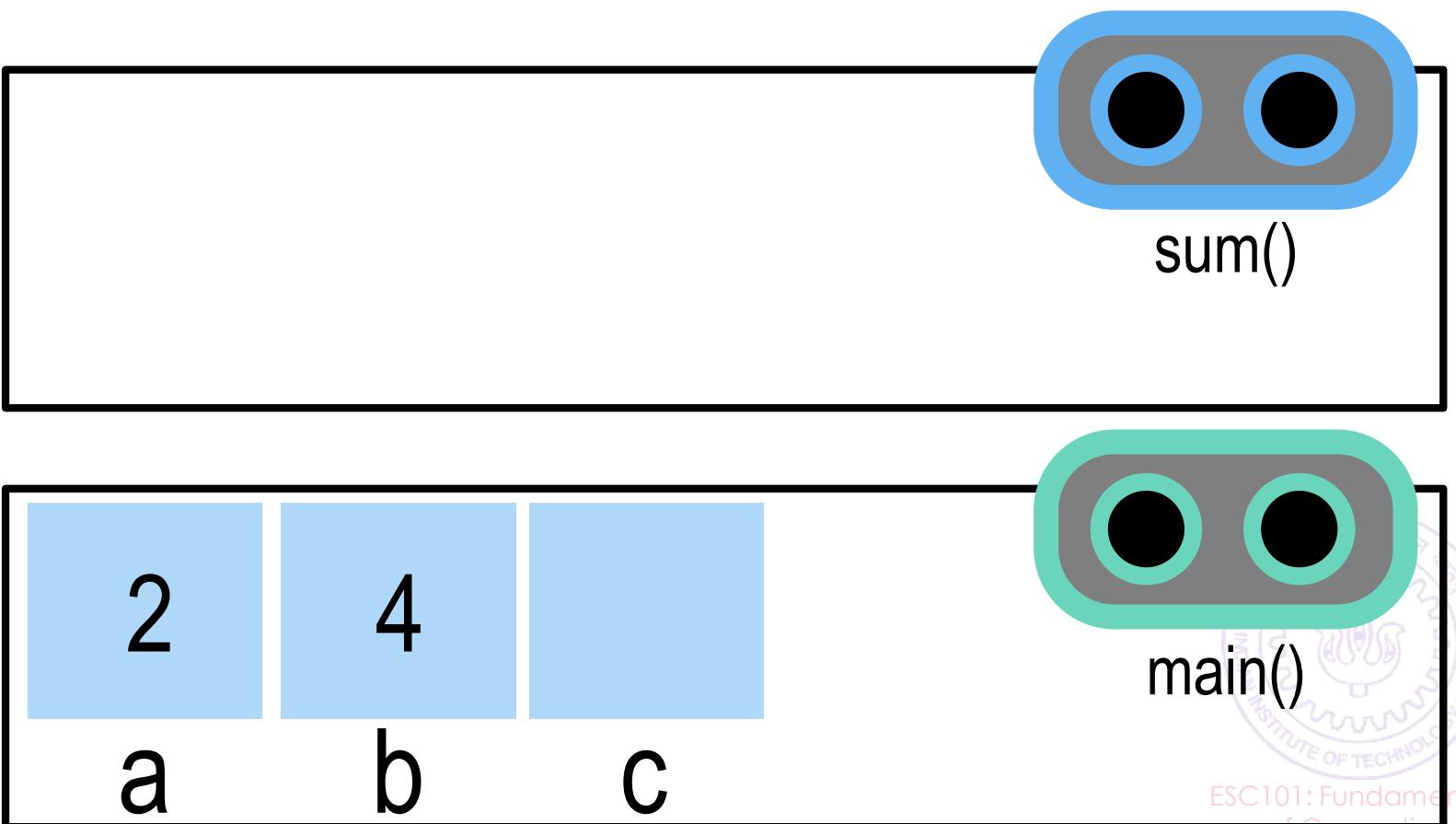
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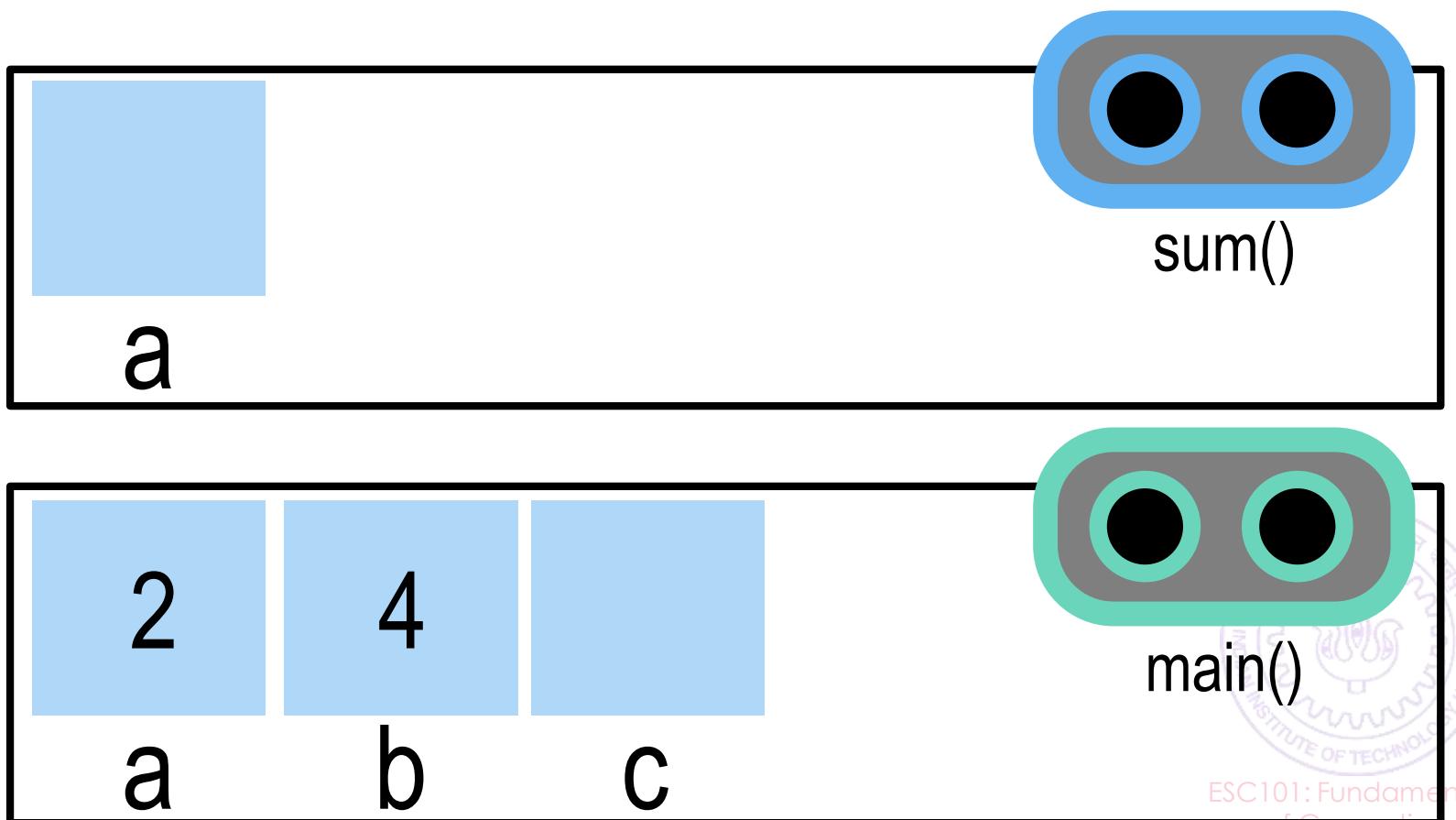
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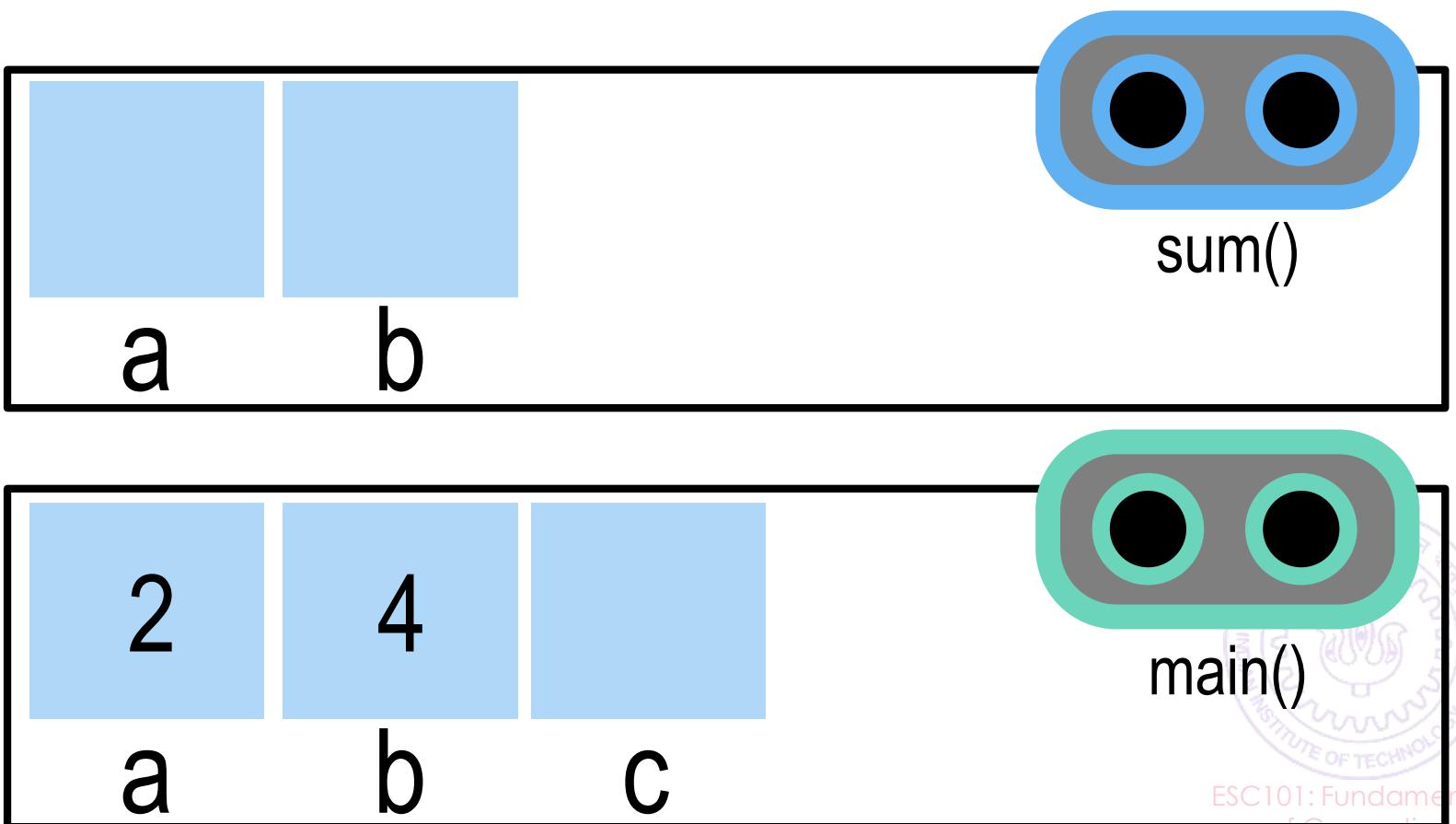
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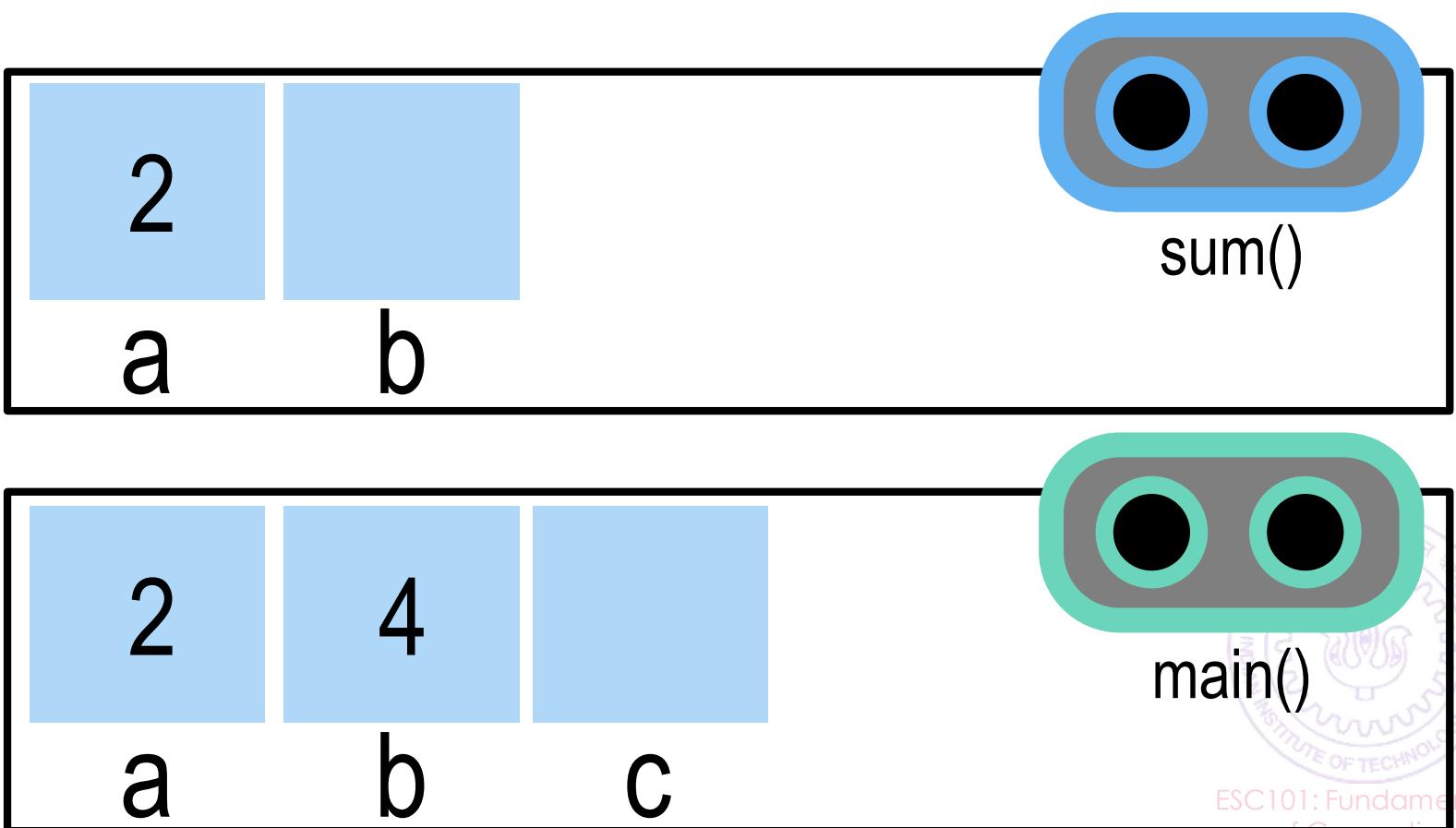
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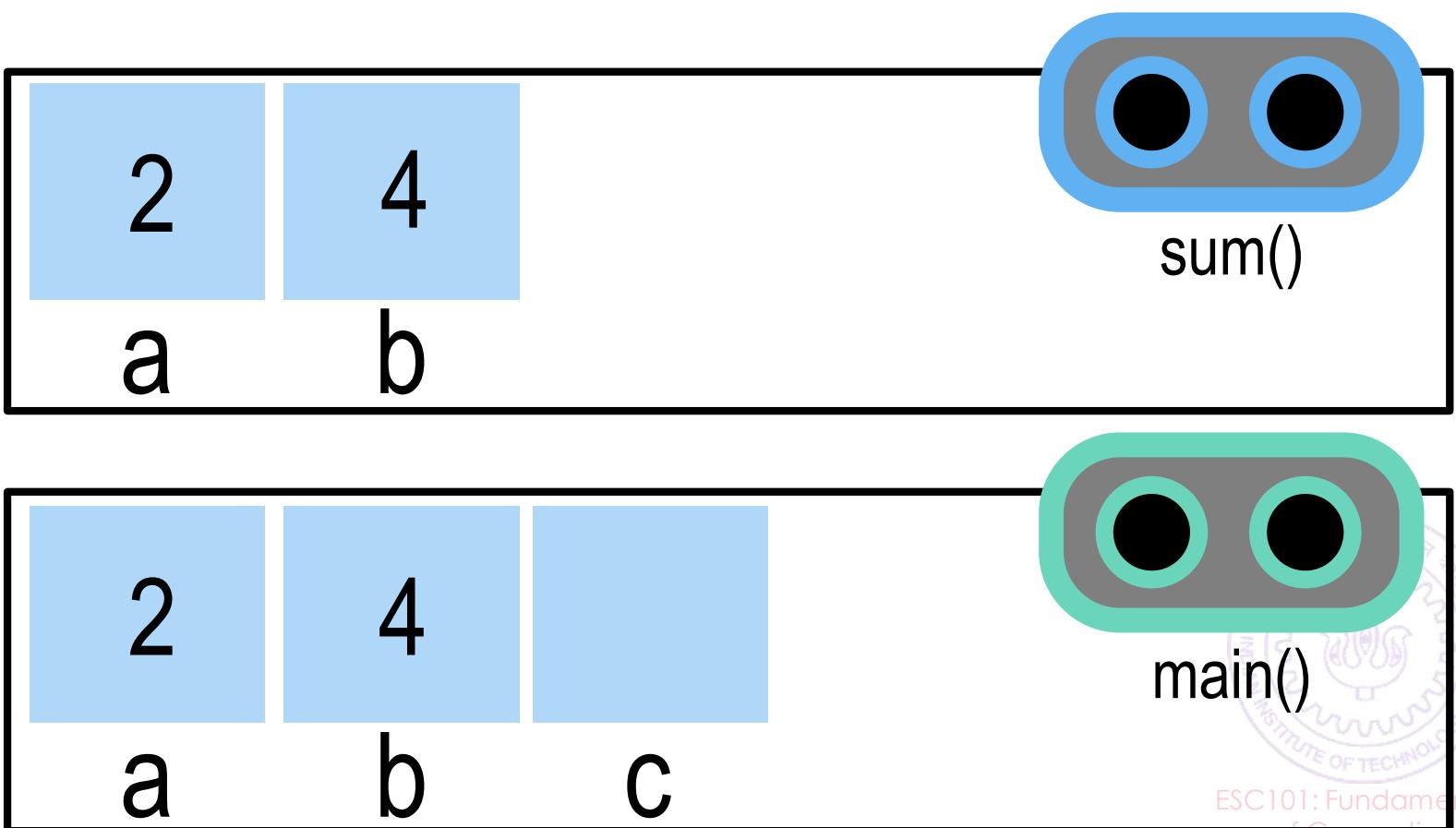
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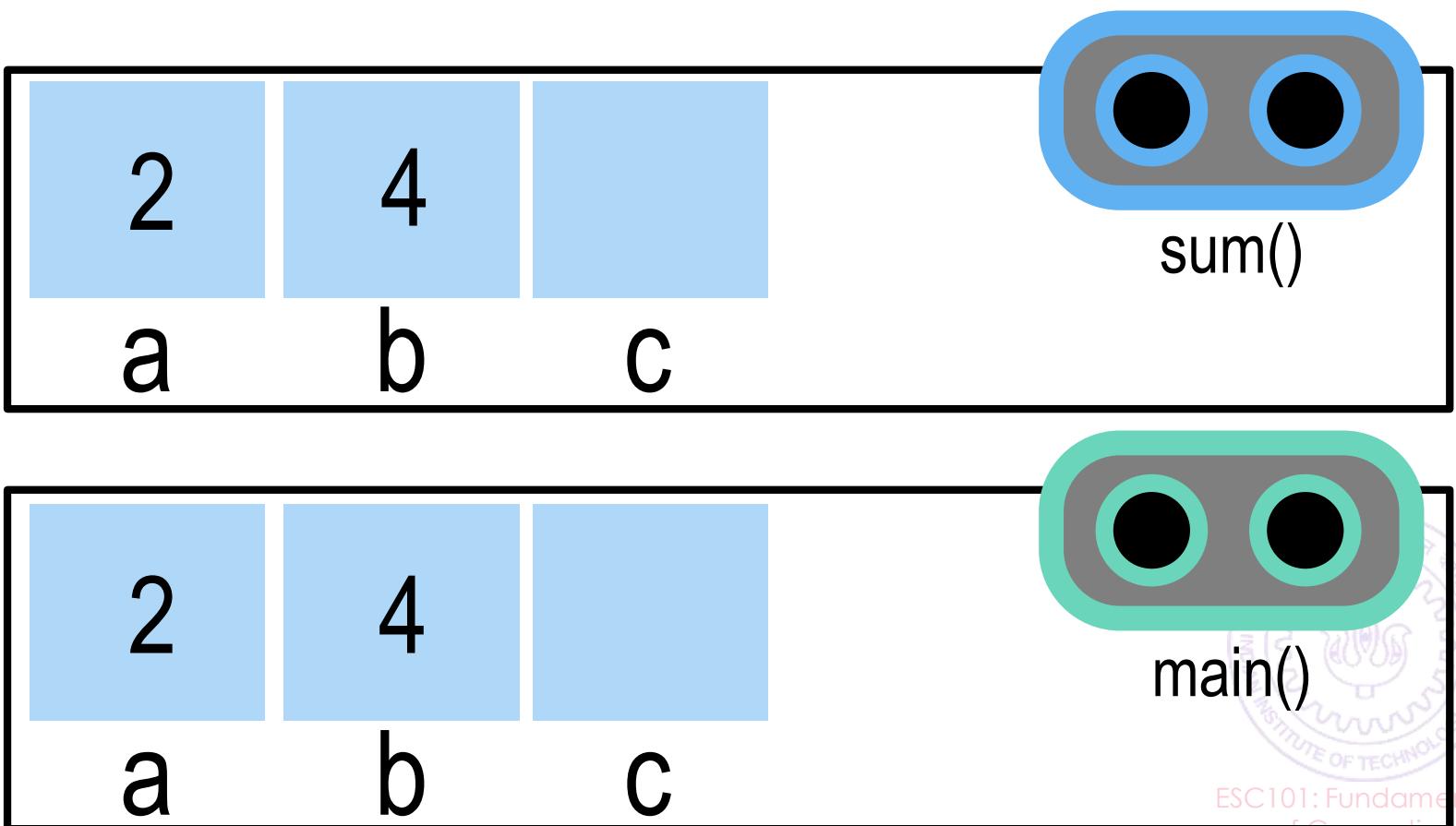
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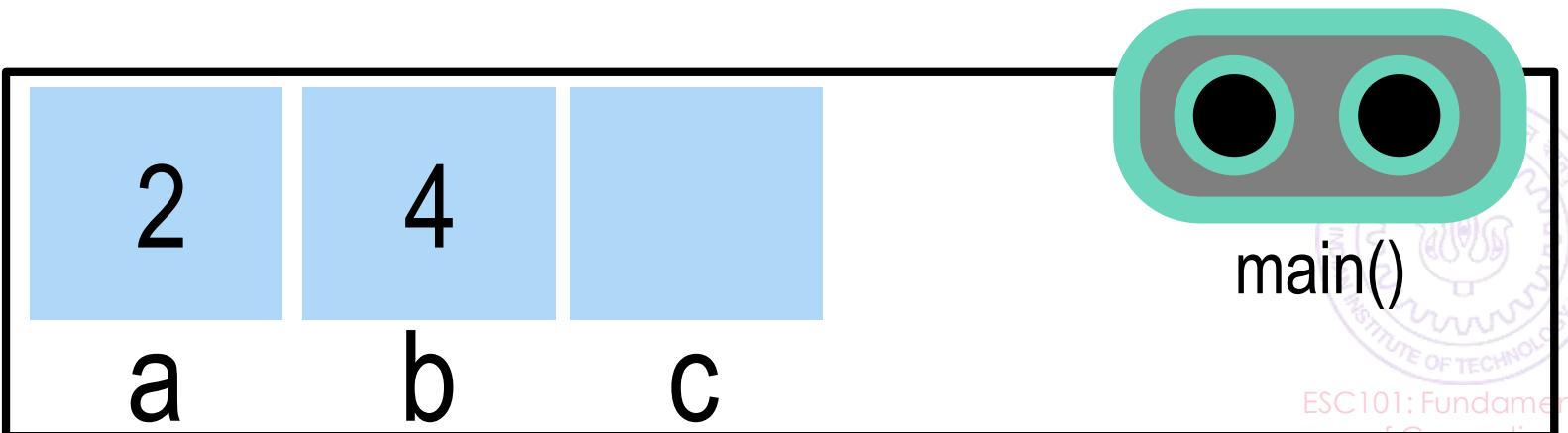
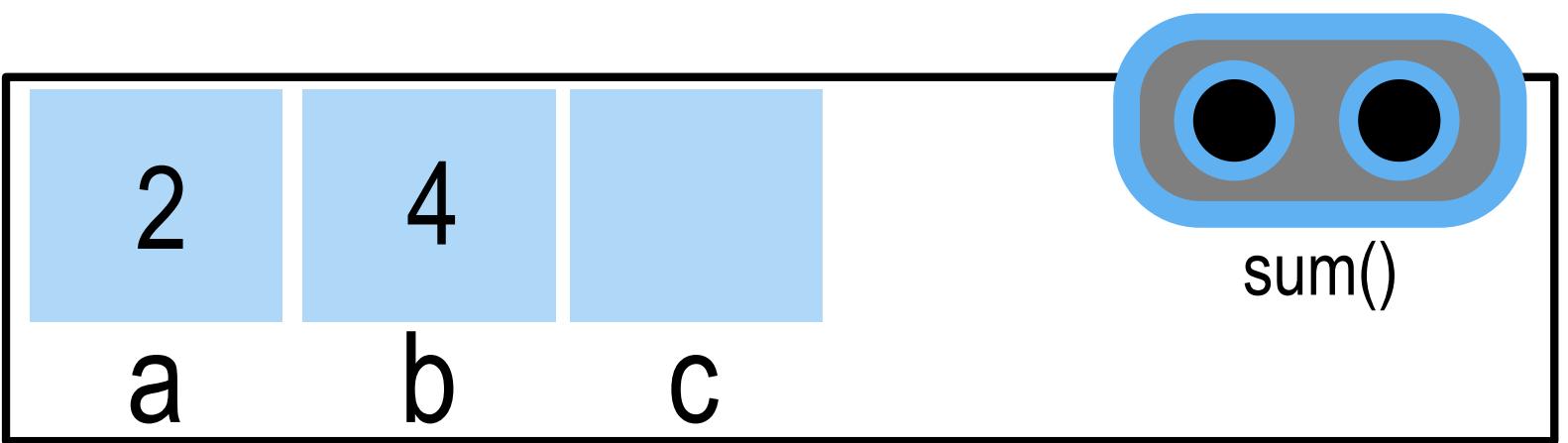
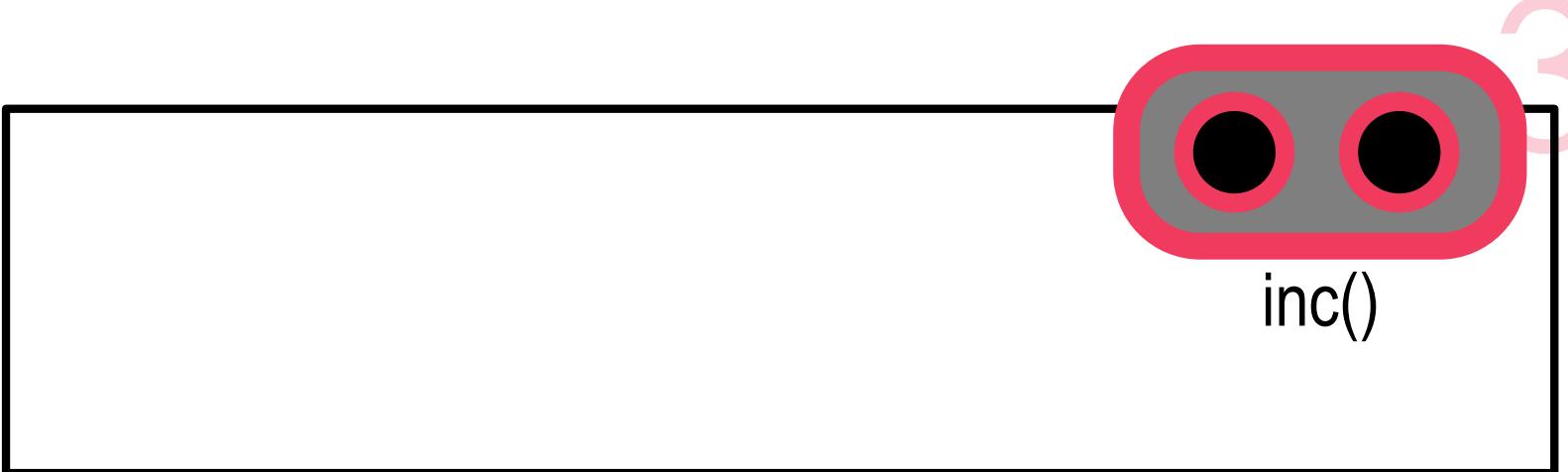
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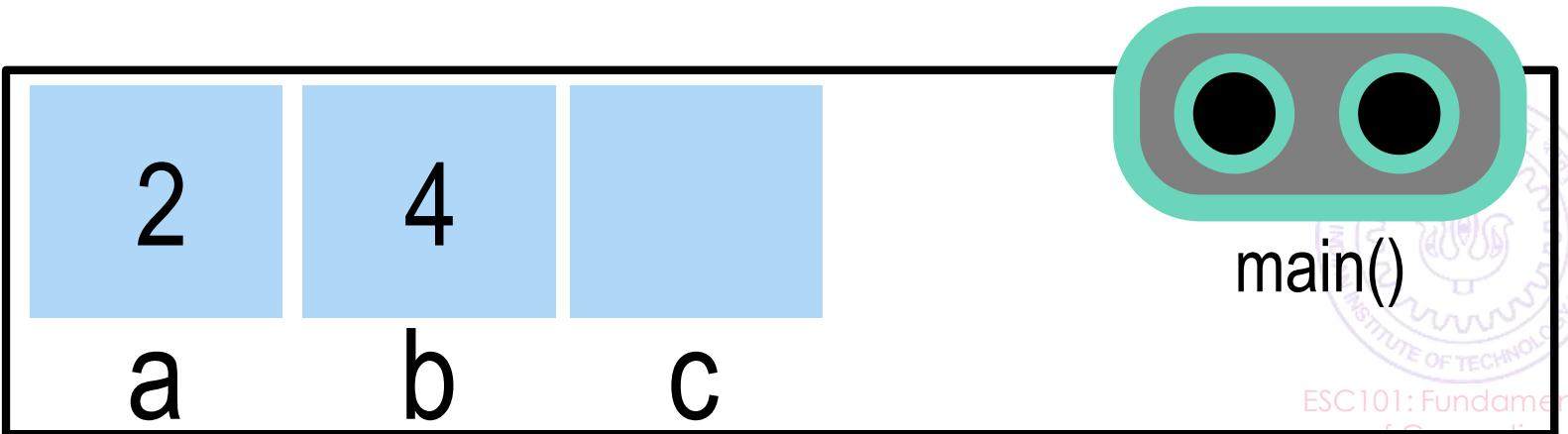
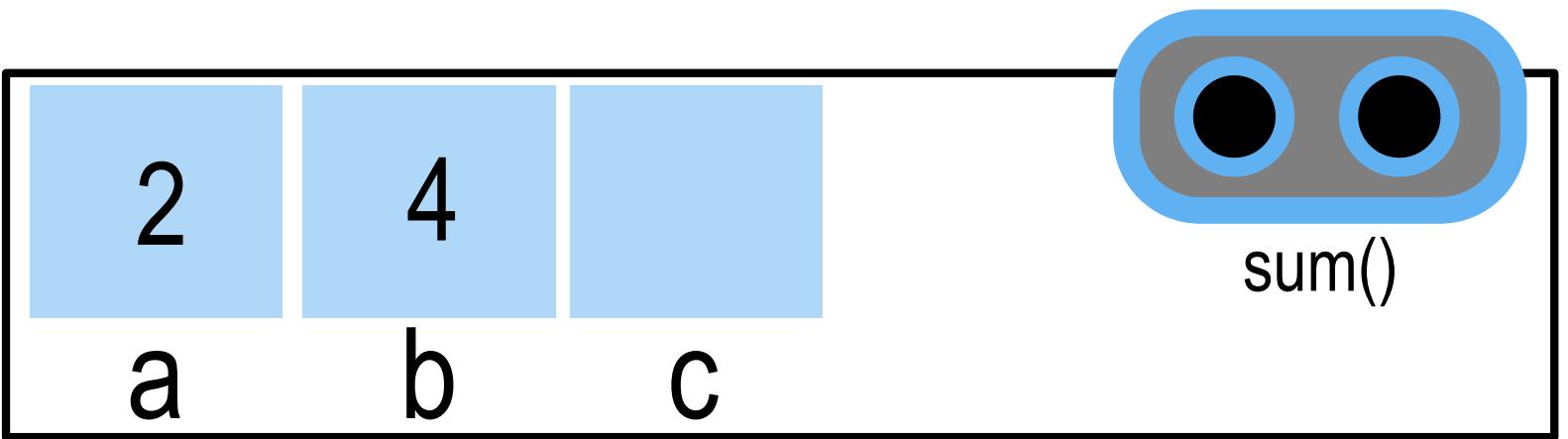
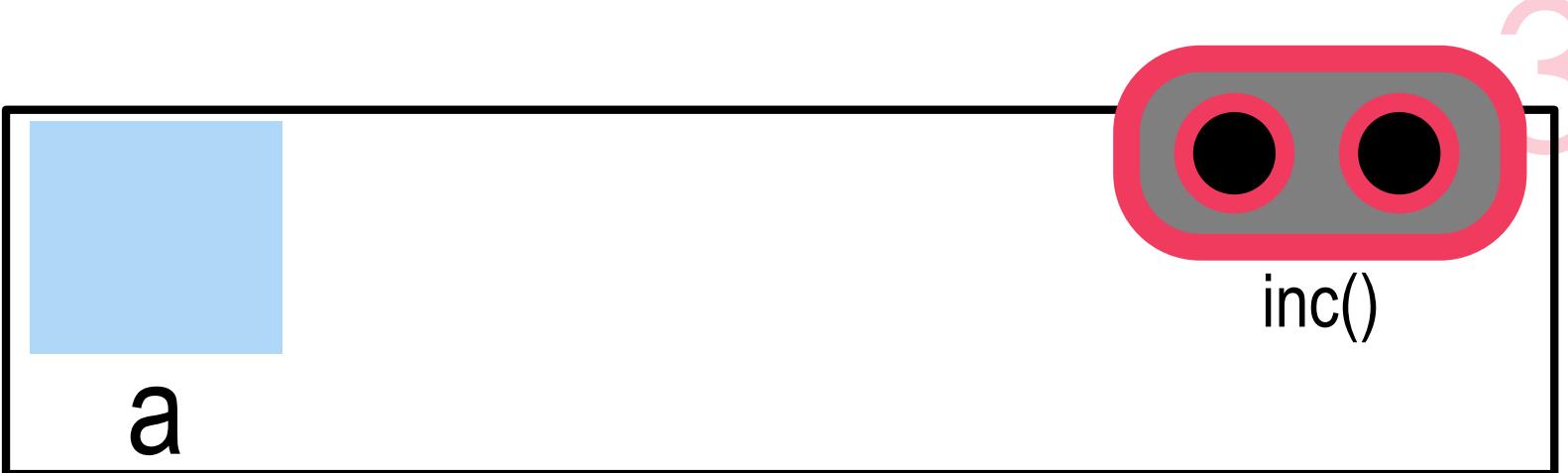
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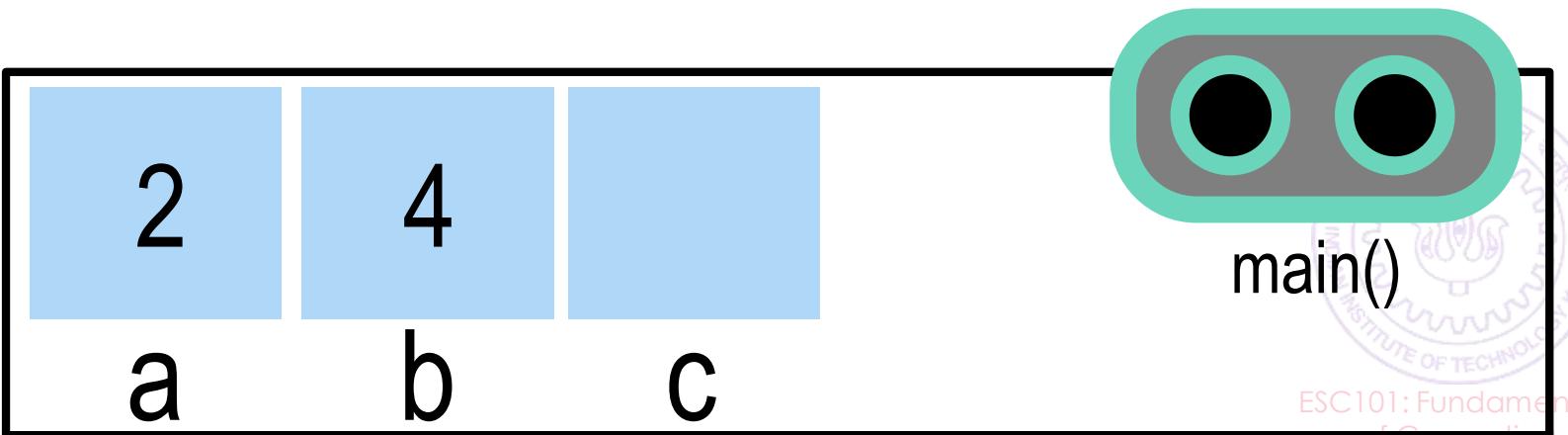
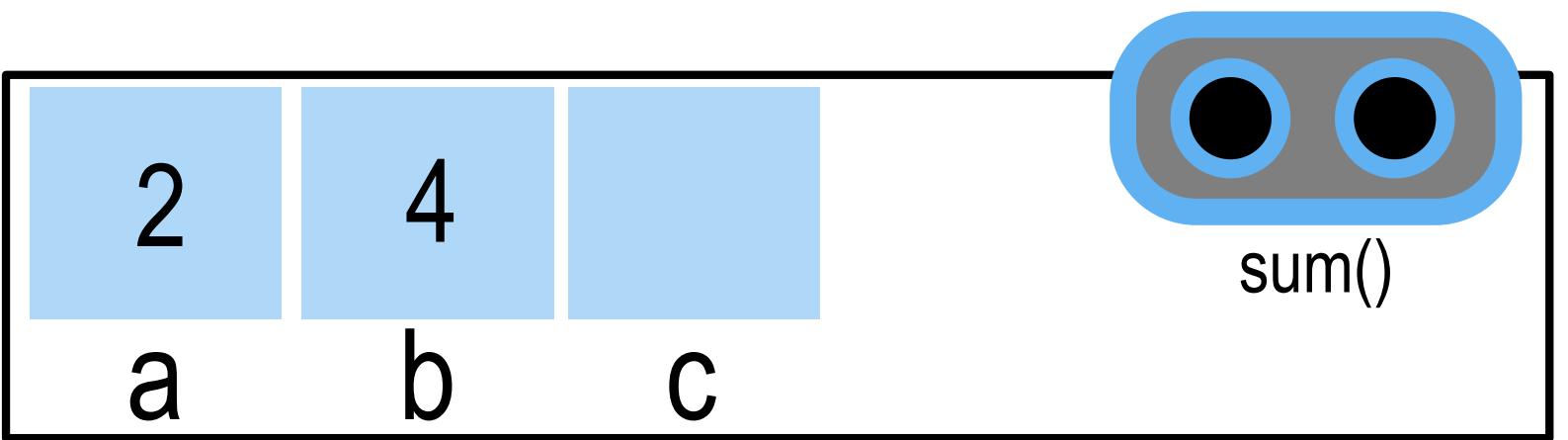
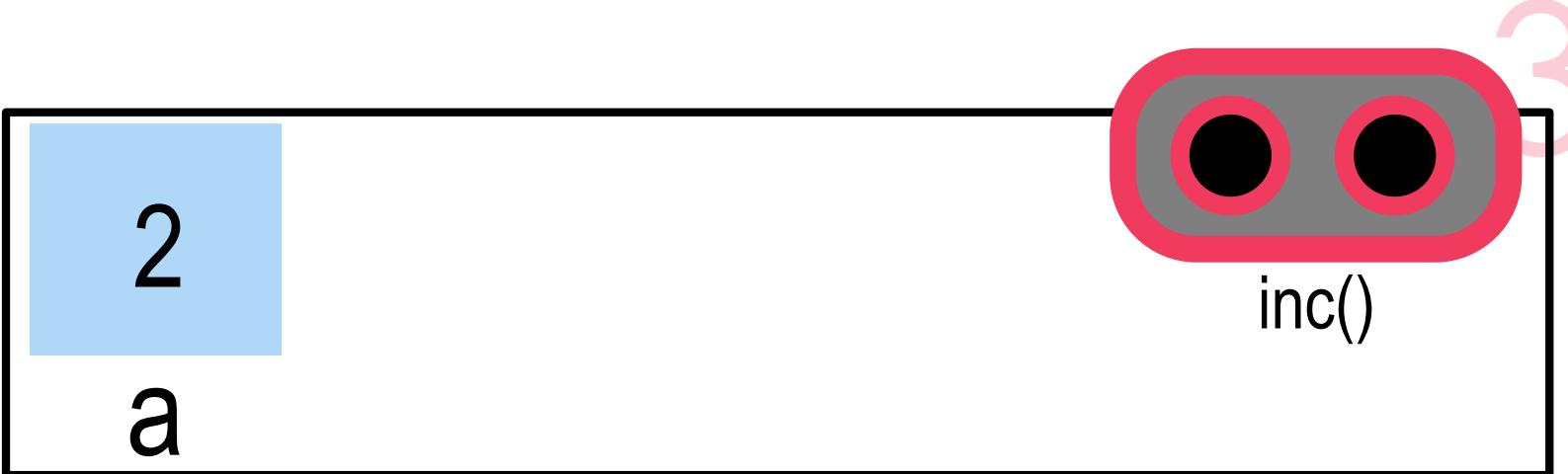
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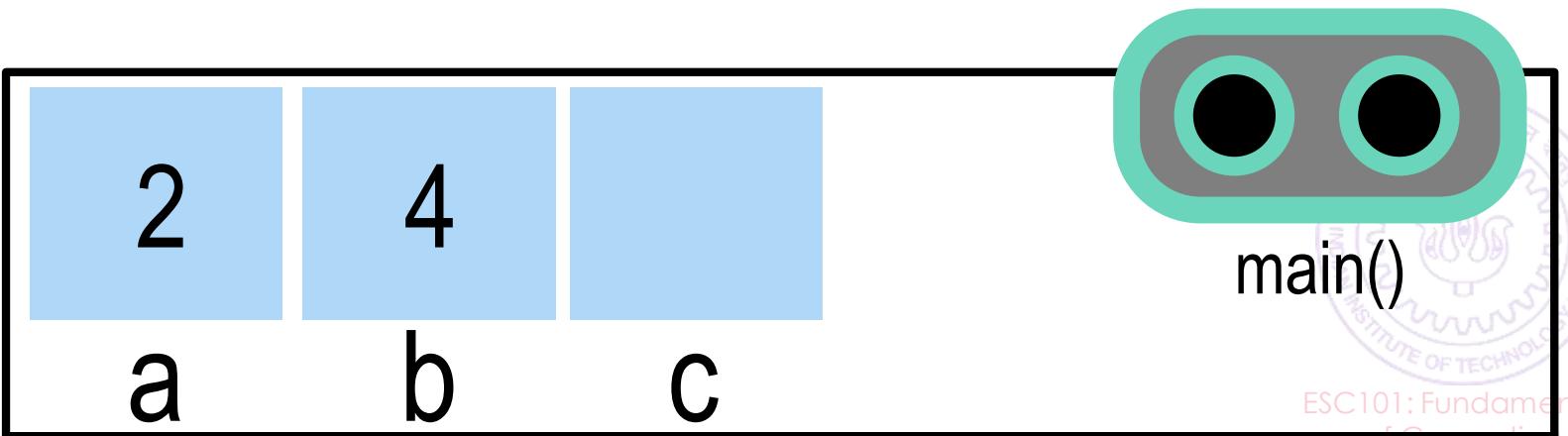
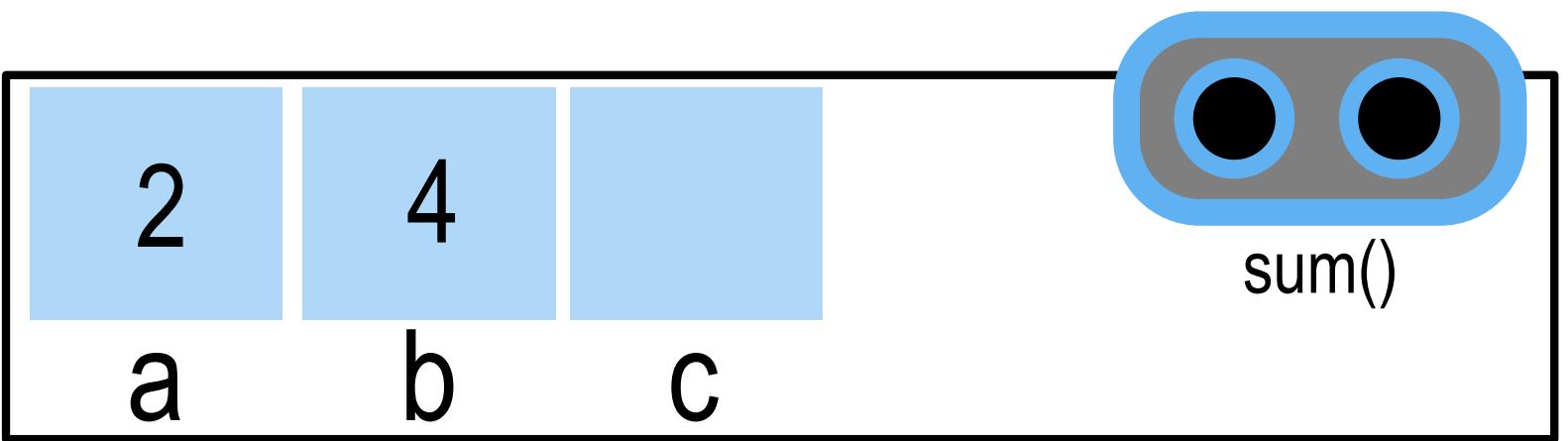
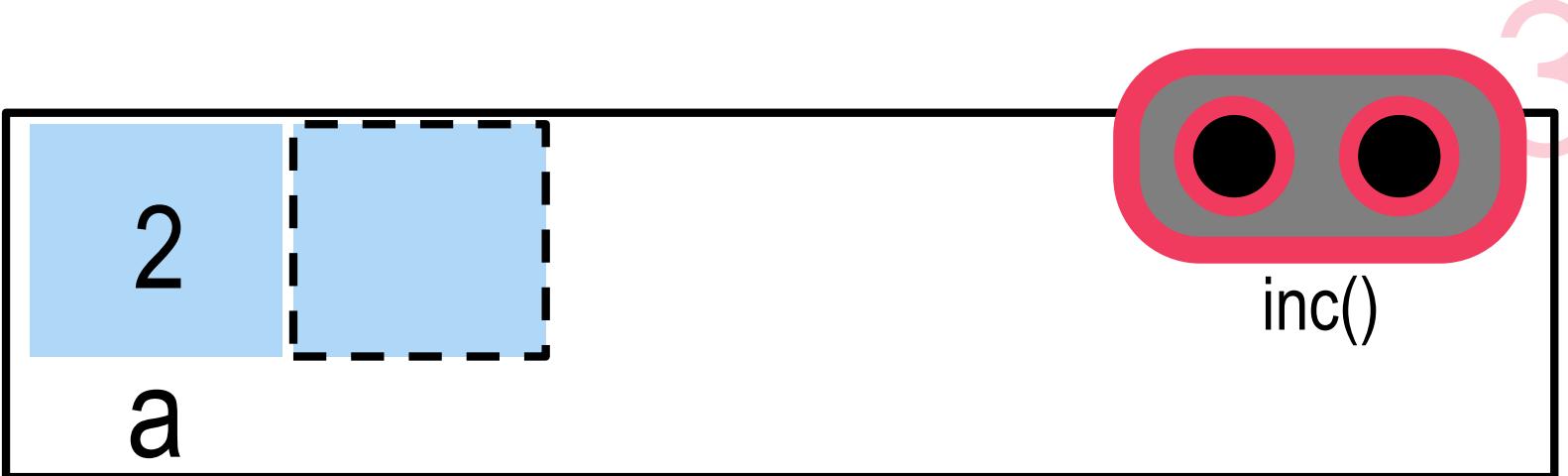
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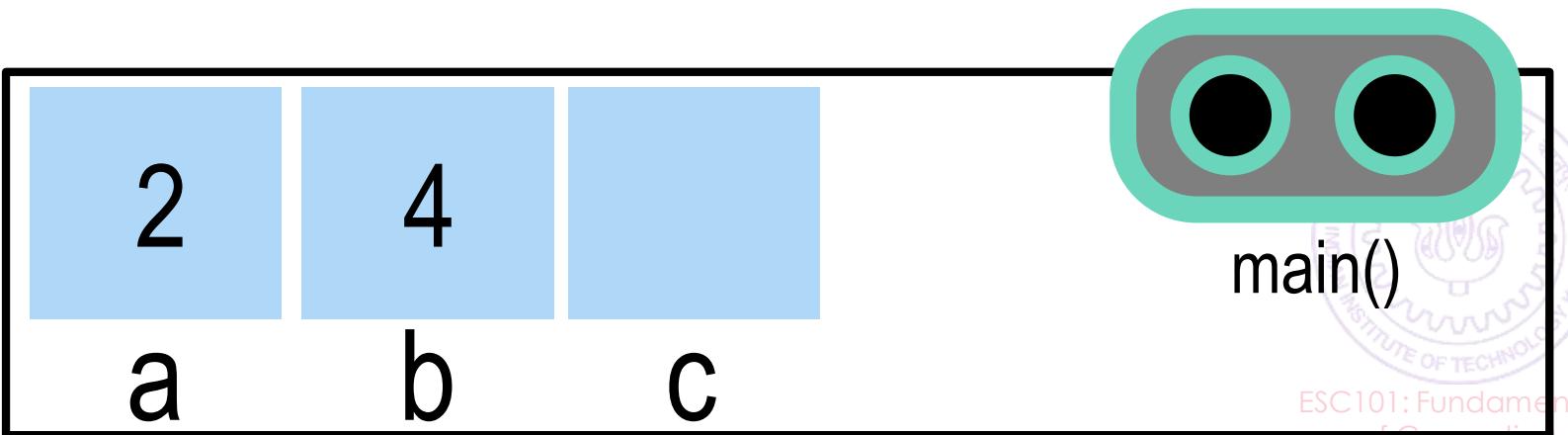
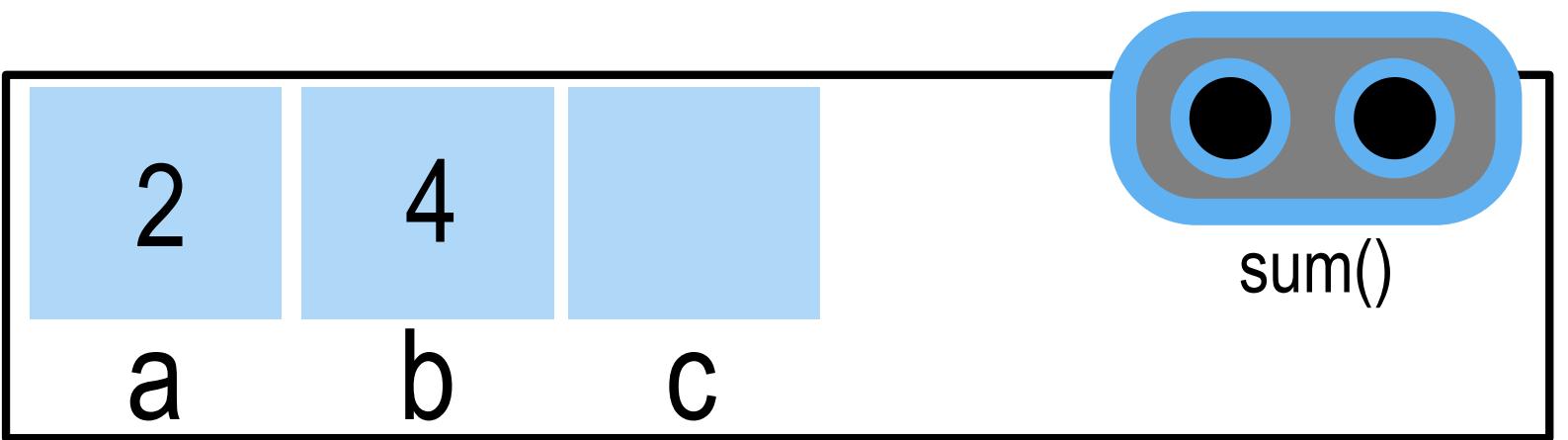
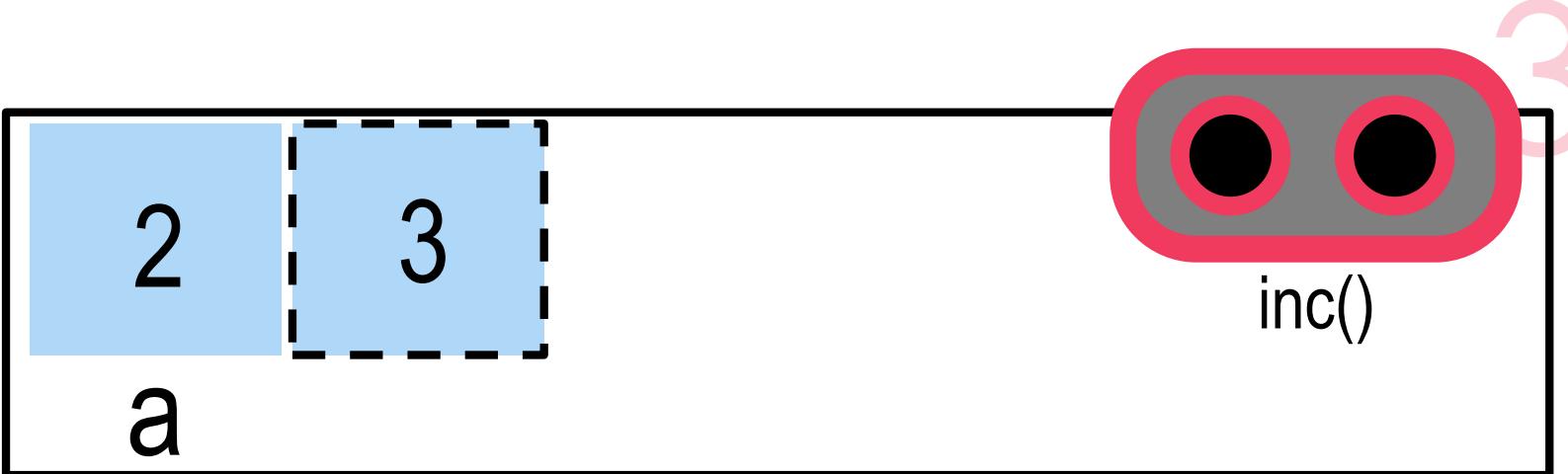
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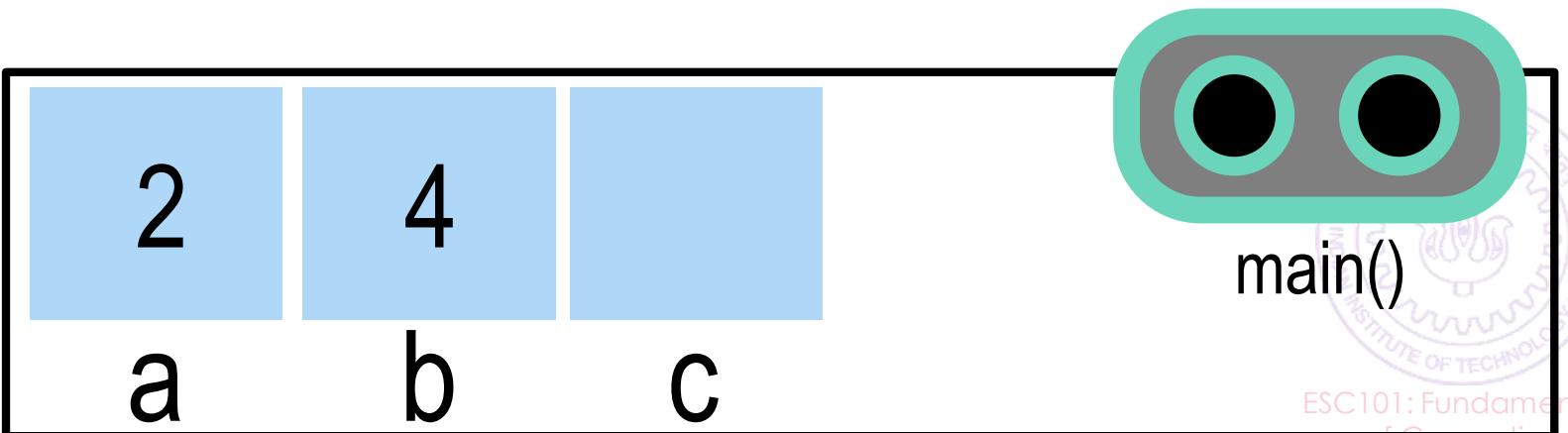
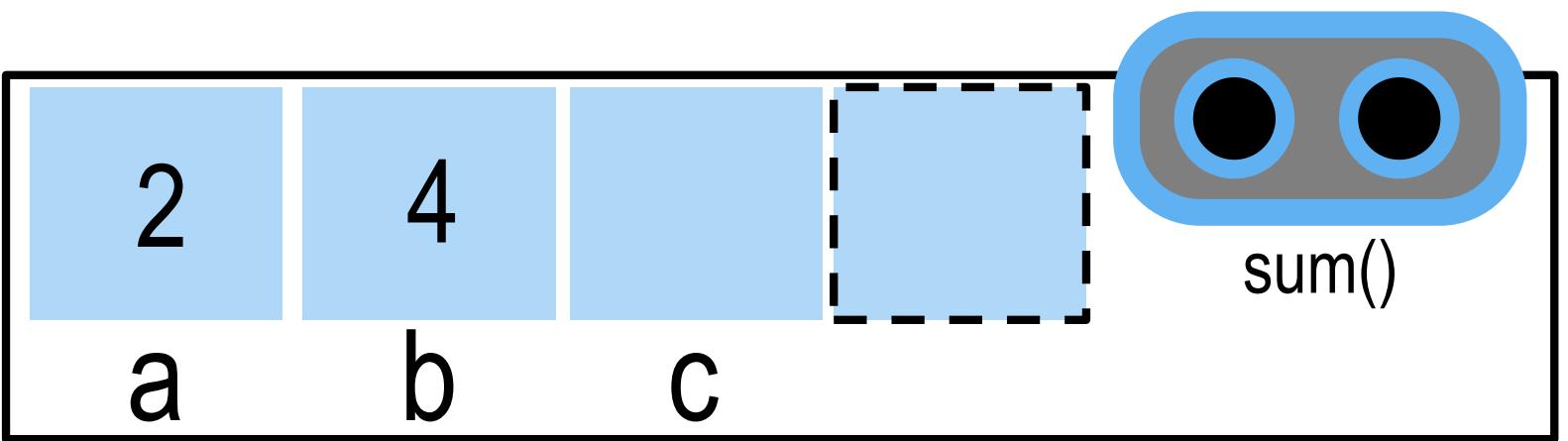
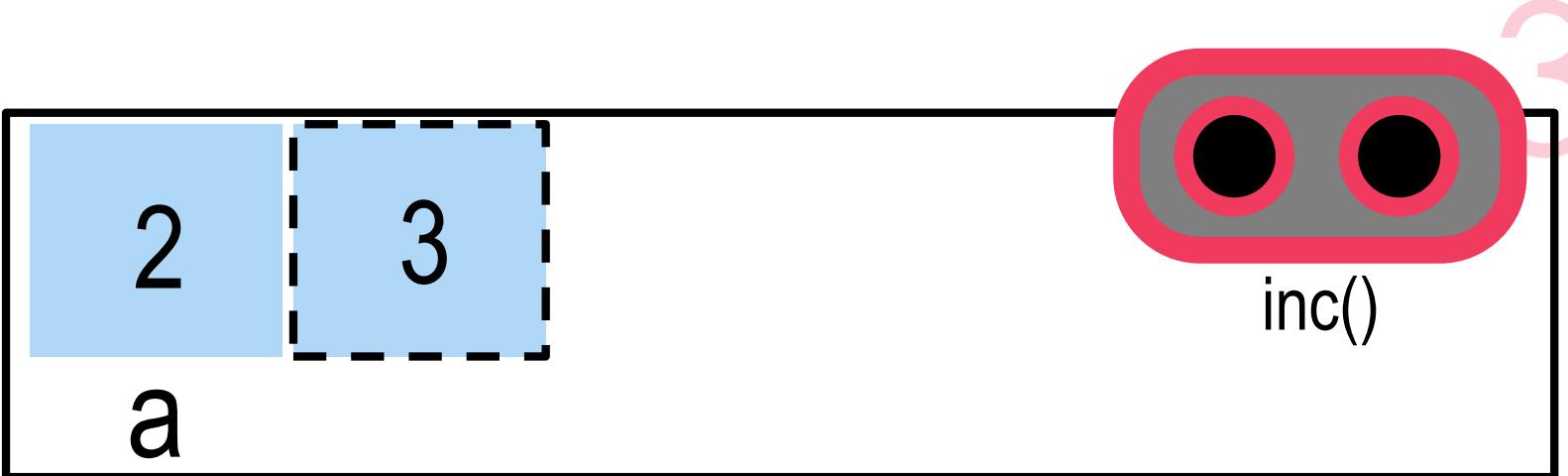
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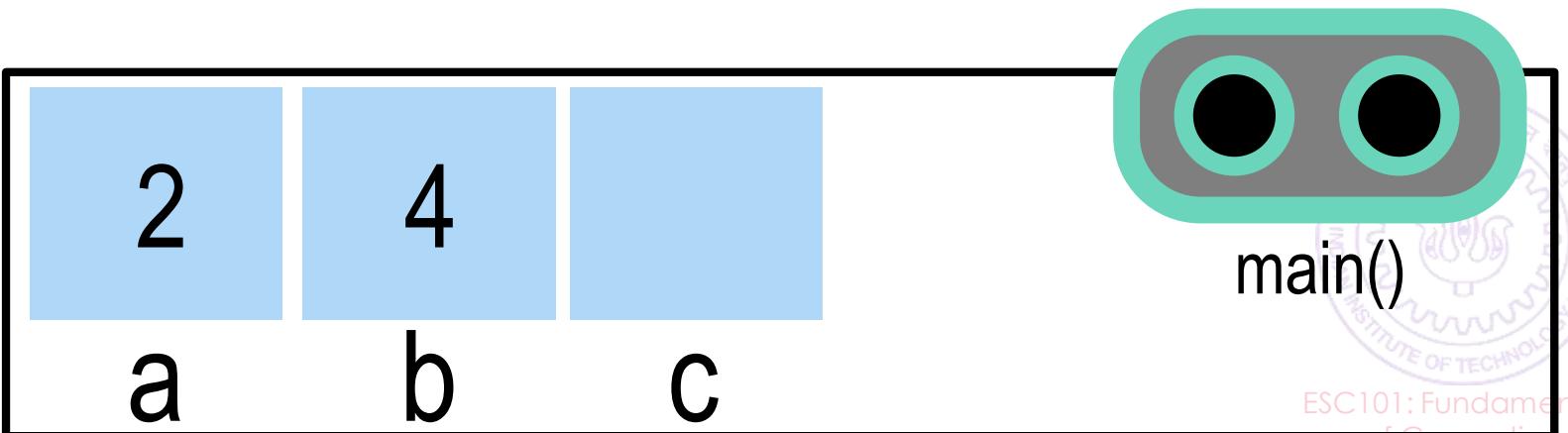
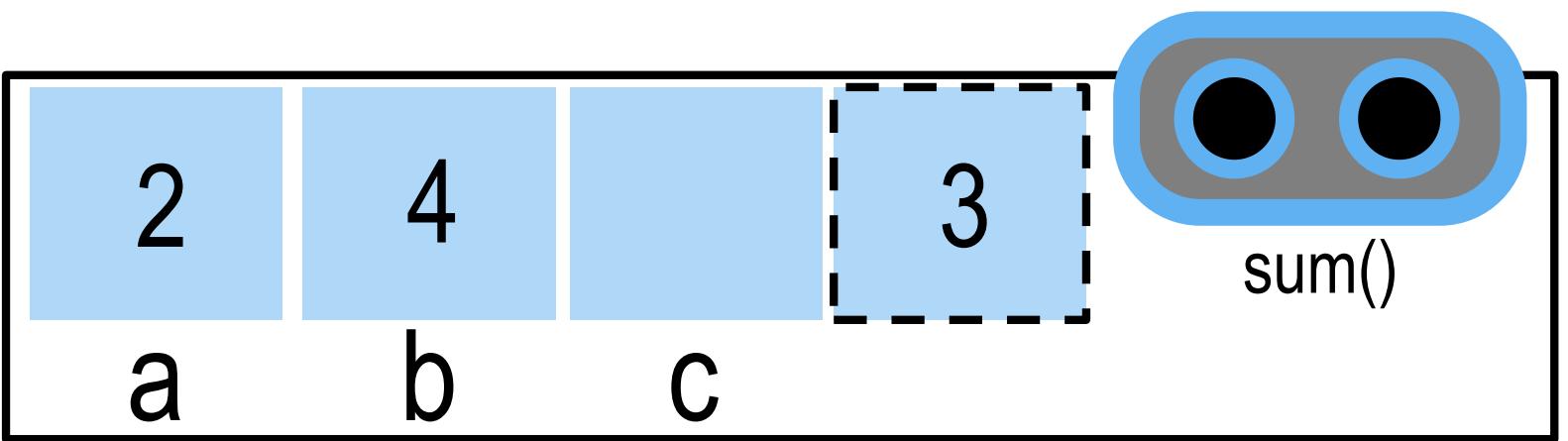
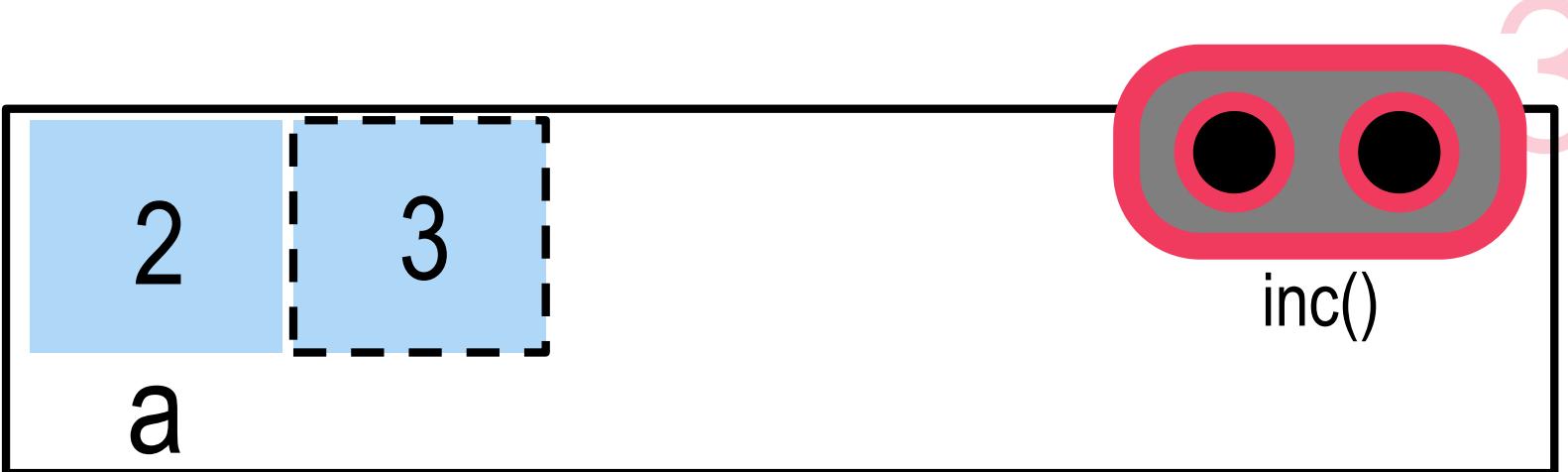
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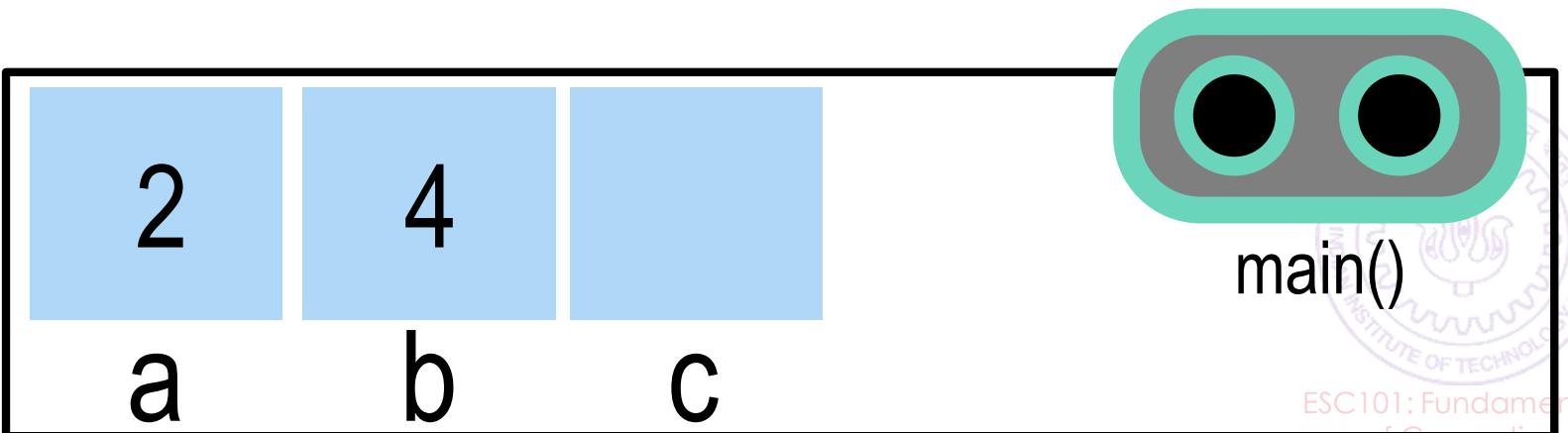
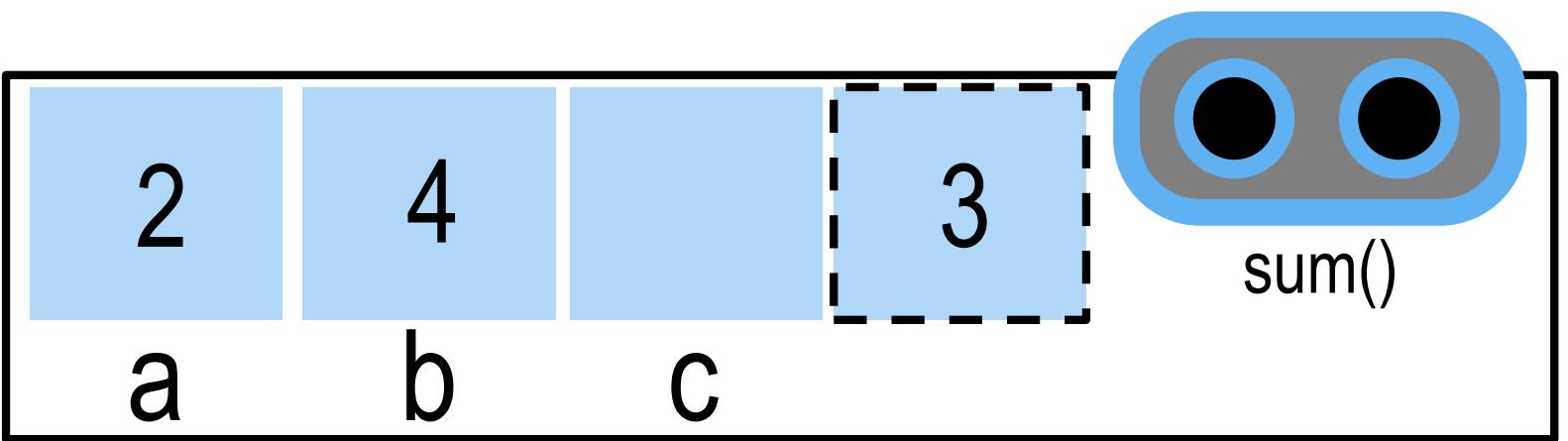
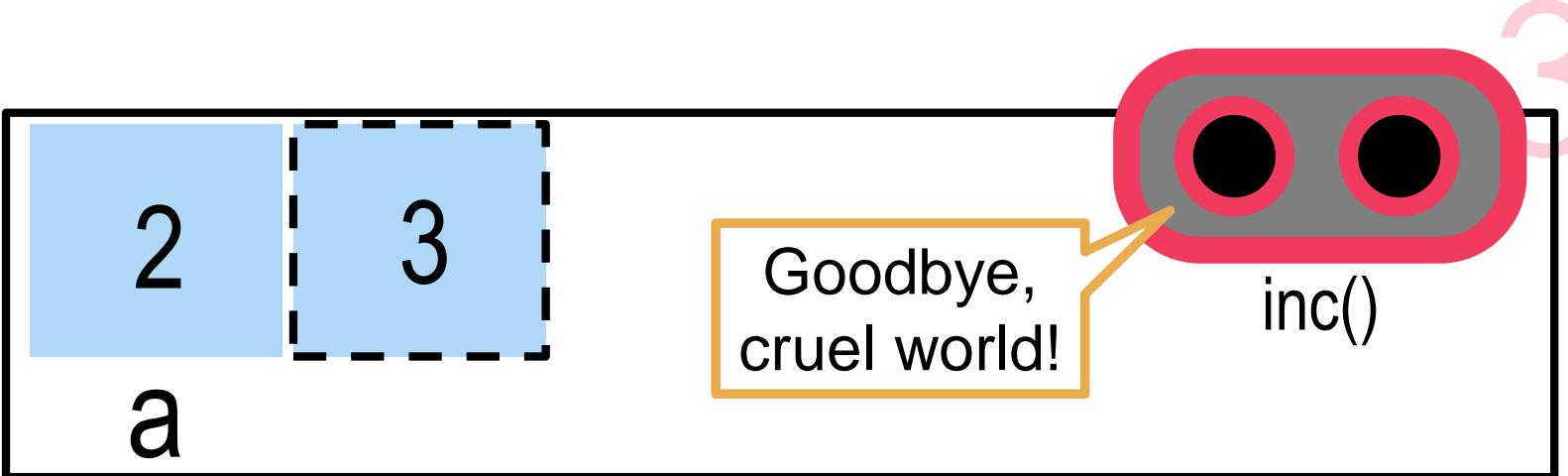


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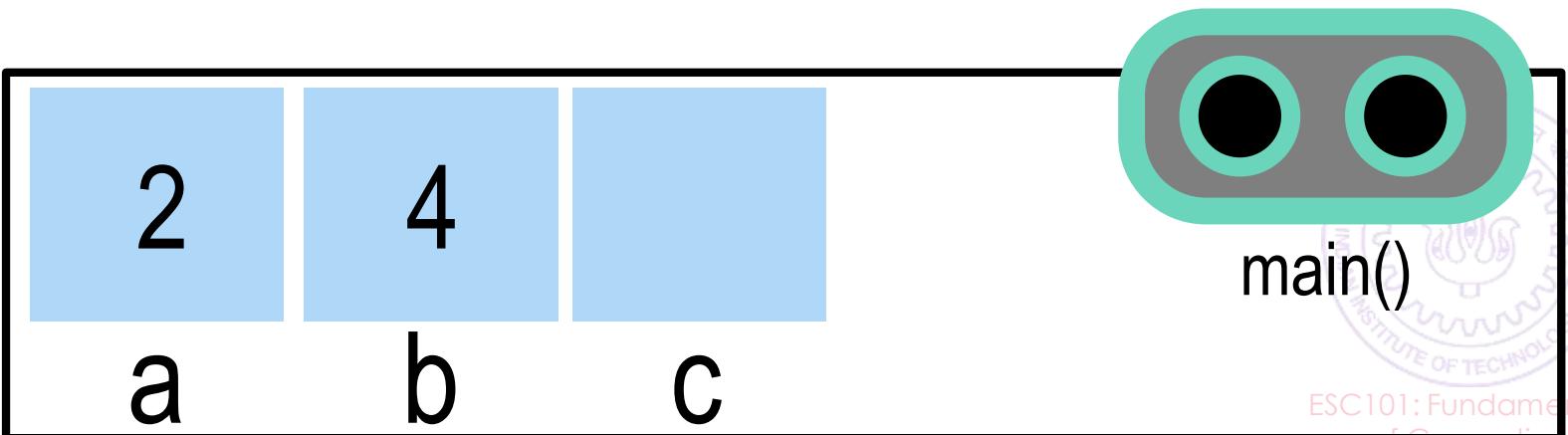
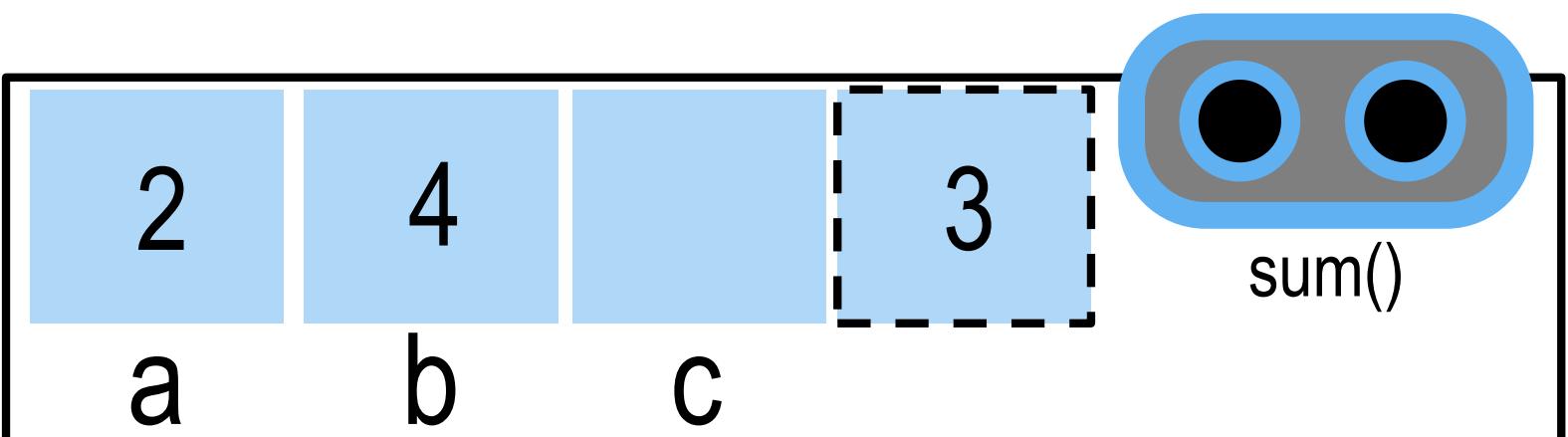
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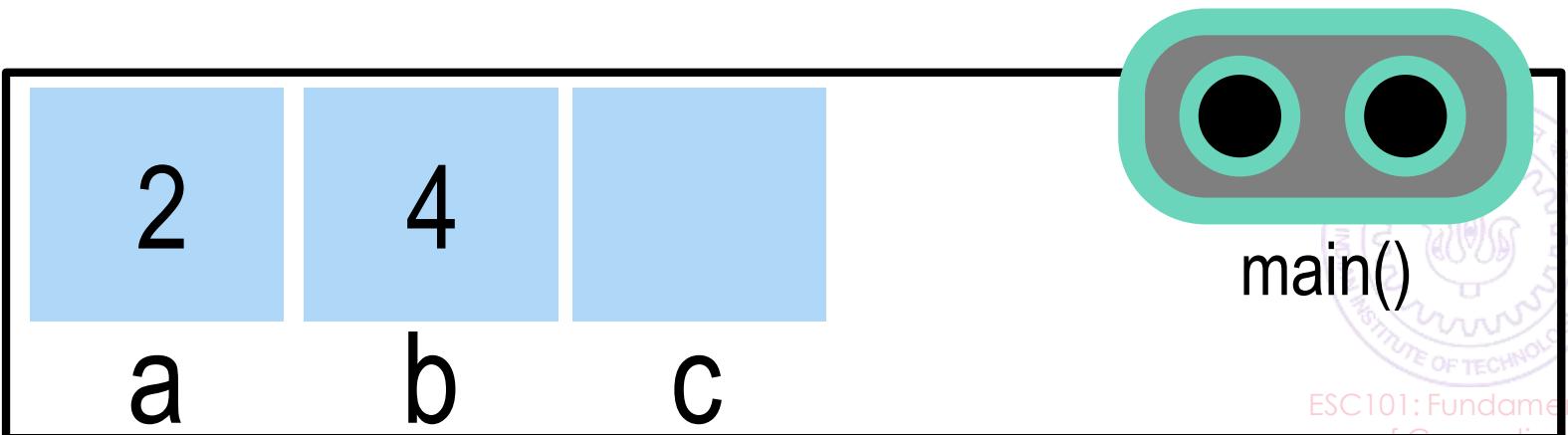
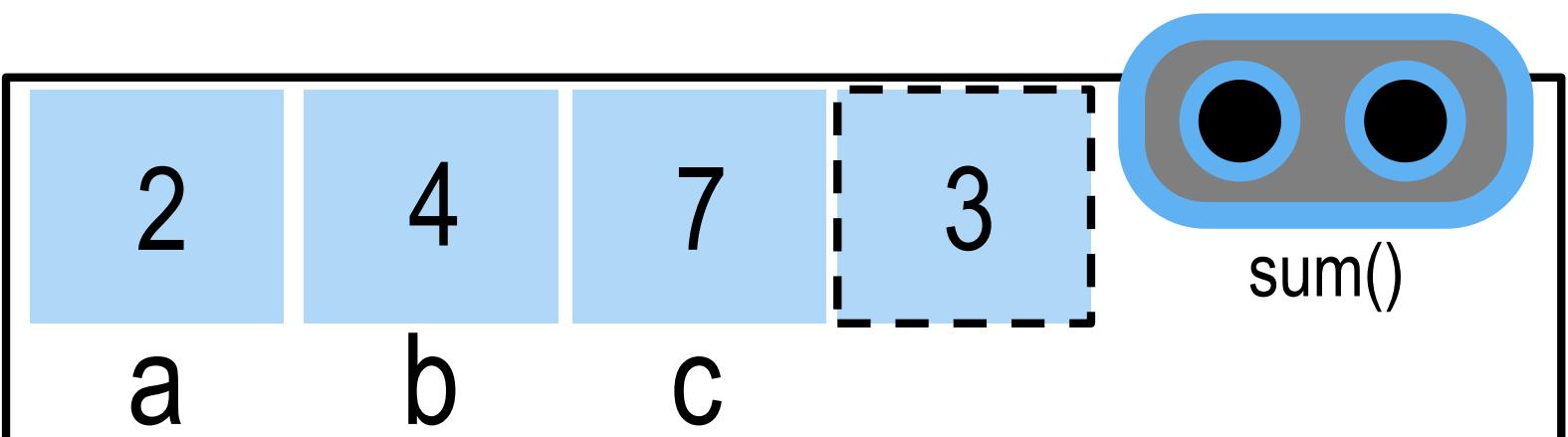
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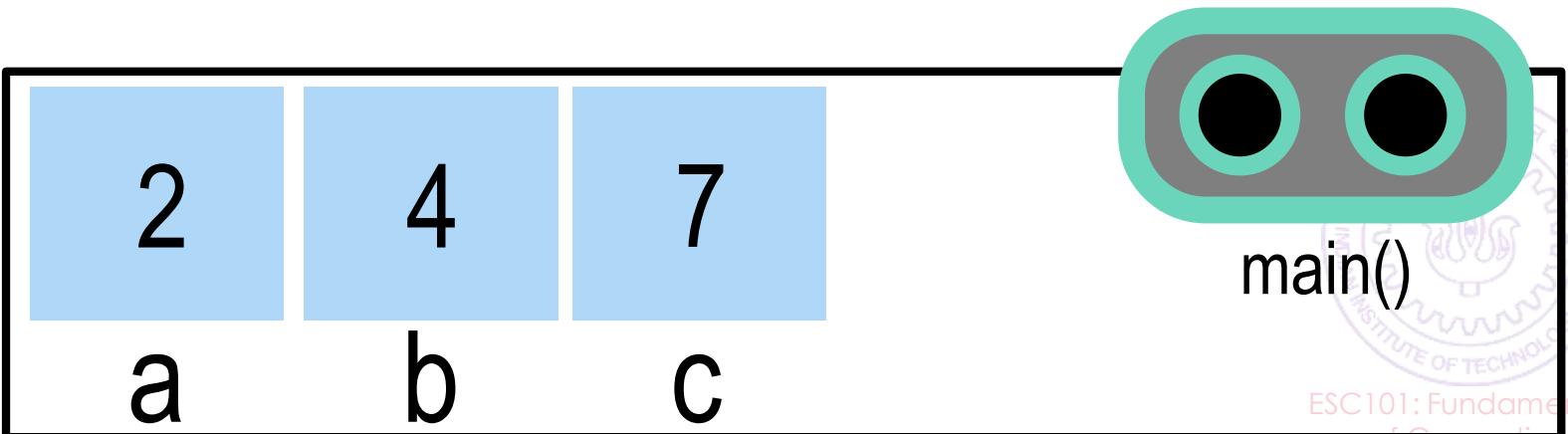
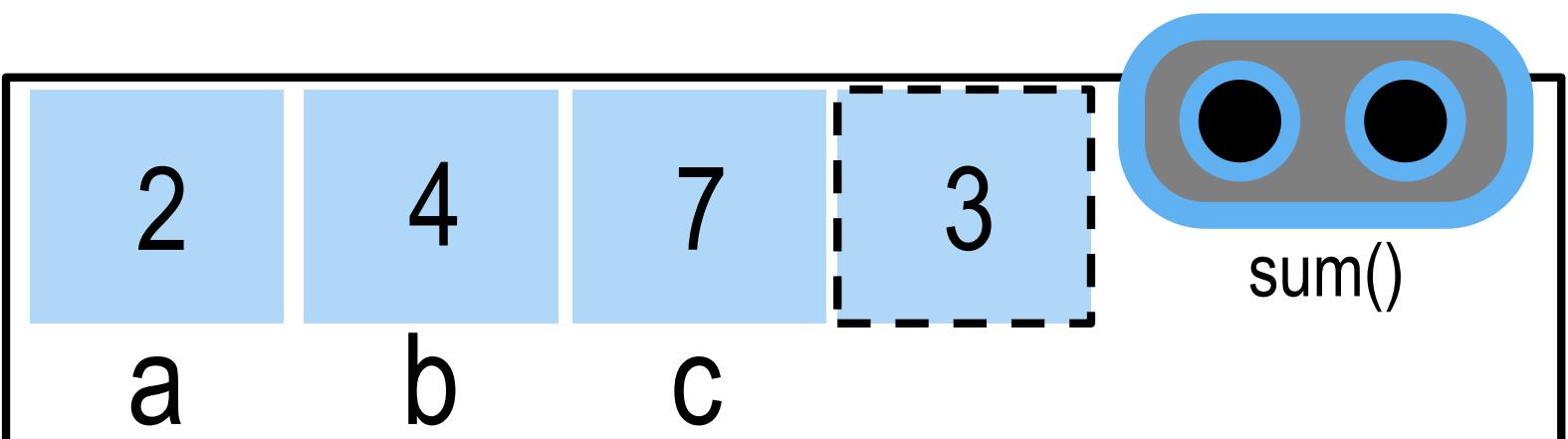
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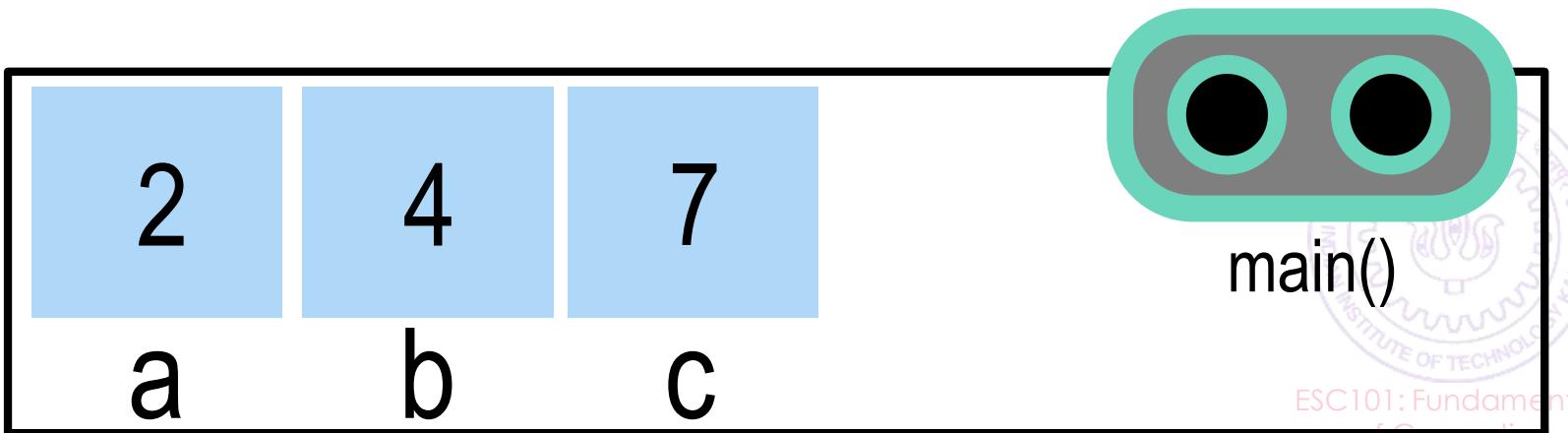
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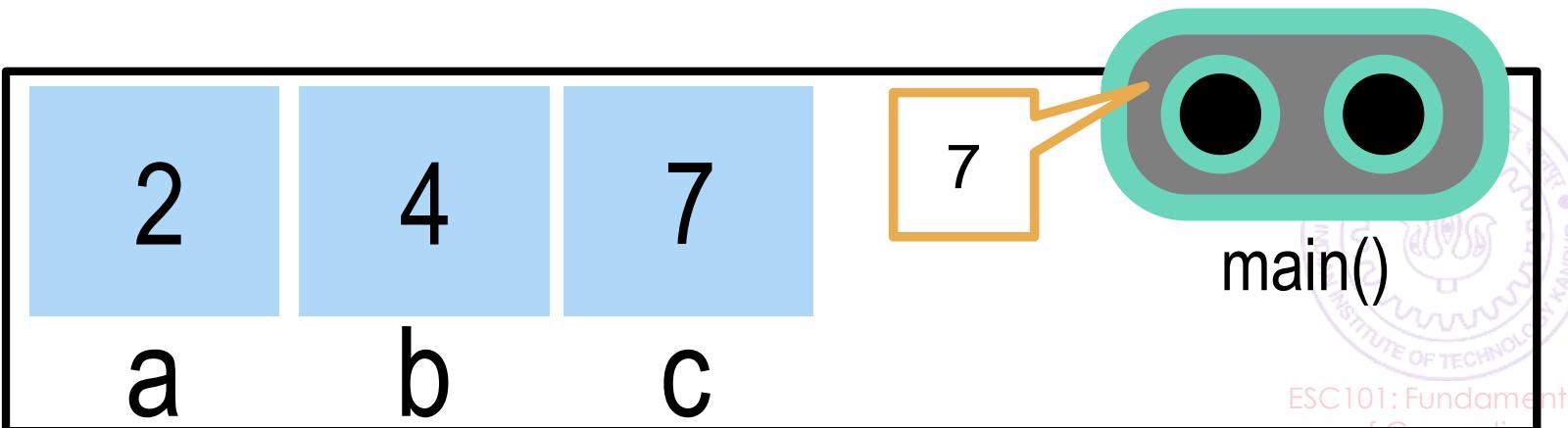
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# Same function called repeatedly

4



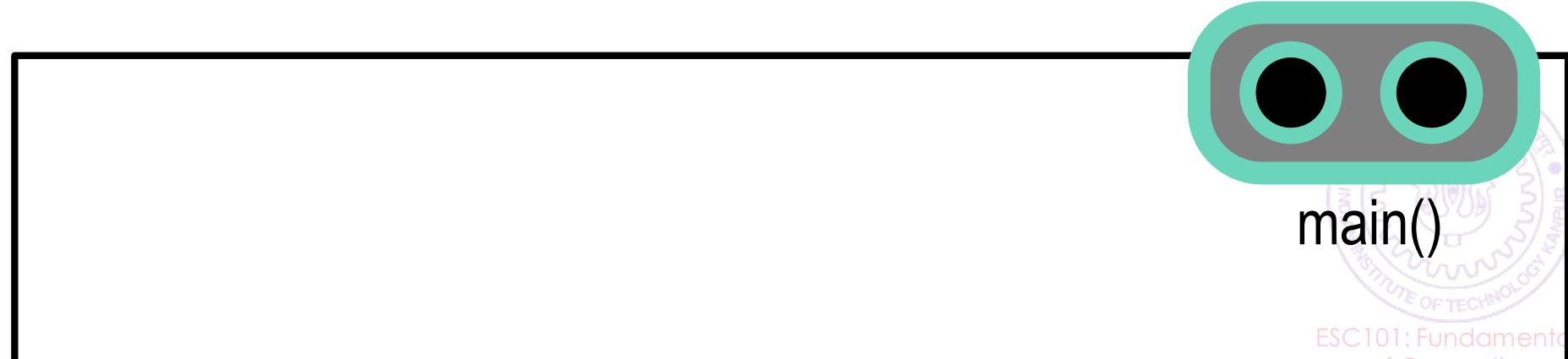
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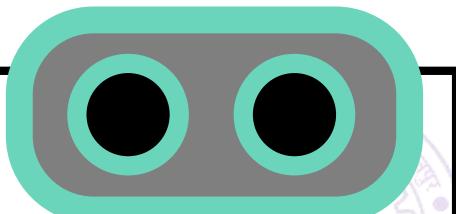
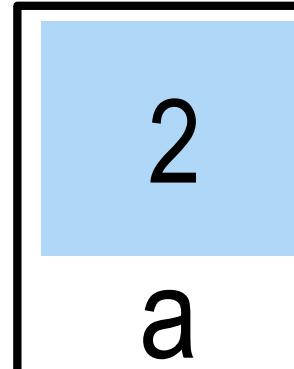
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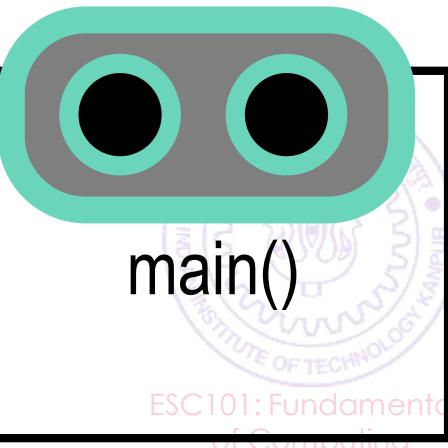
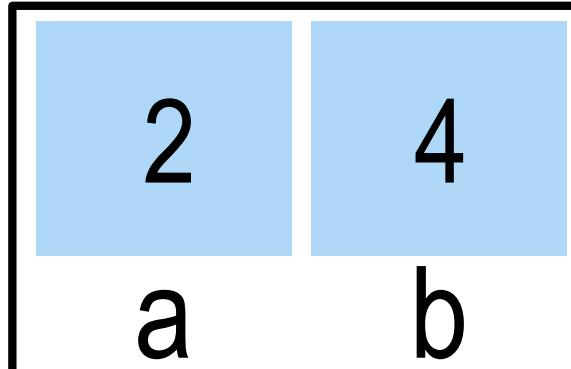
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main()

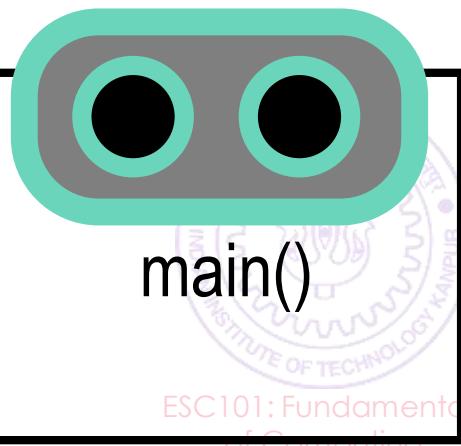
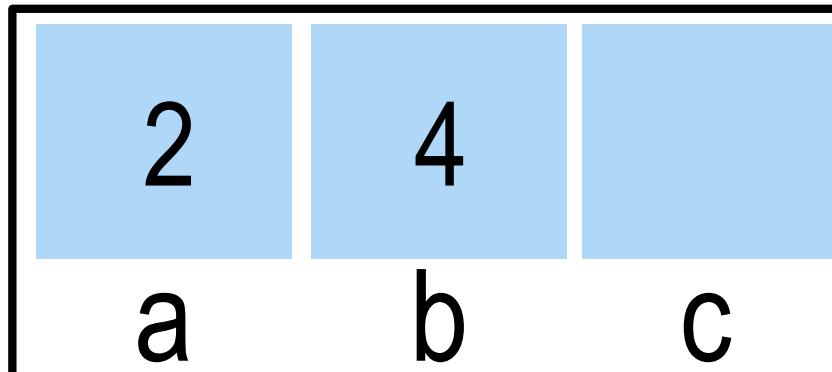
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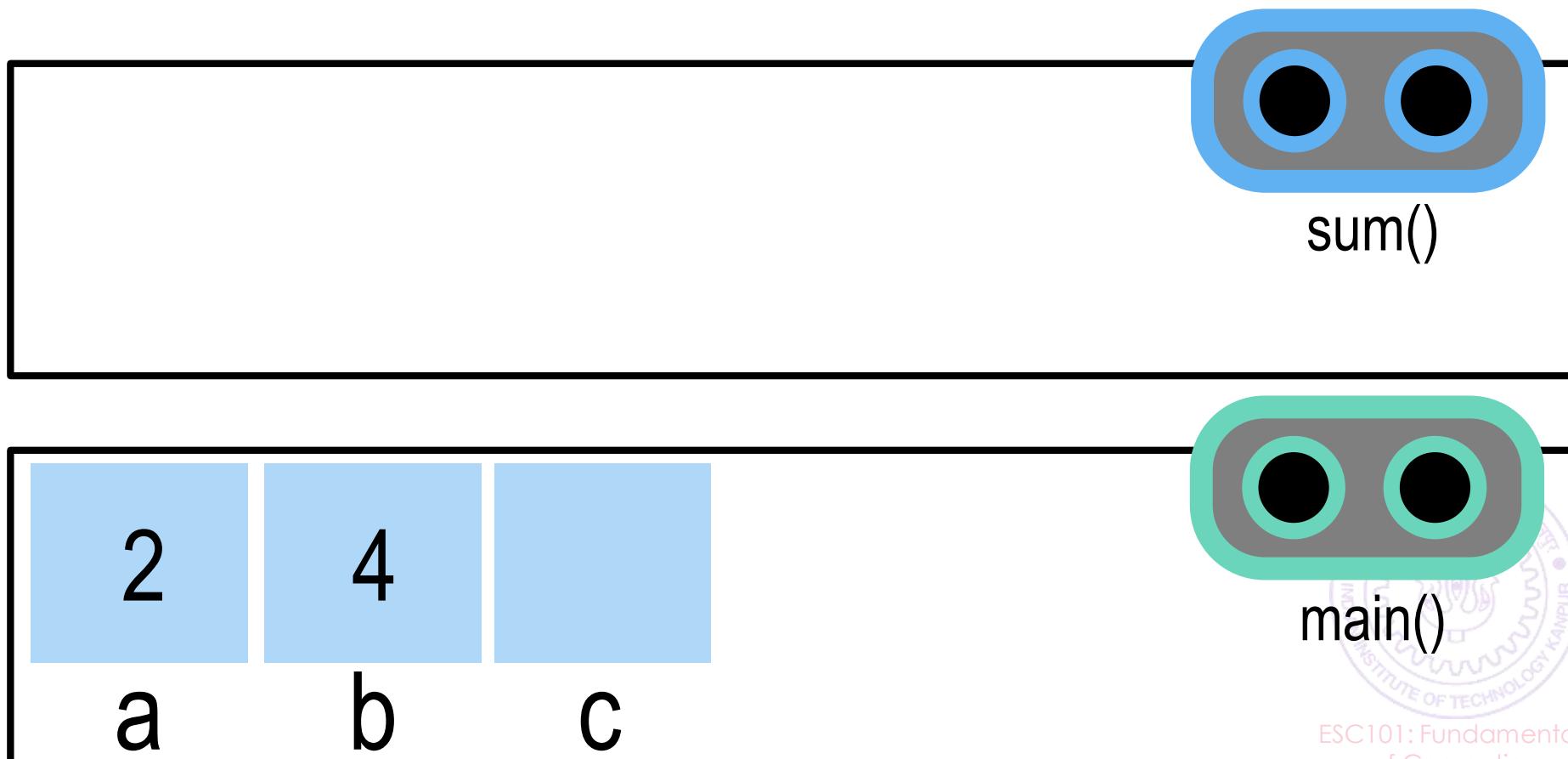
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    return c;  
}  
  
int main(void){  
    int a = 2, b = 4, c;  
    c = sum(a, b);  
    printf("%d", c);  
    return 0;  
}
```



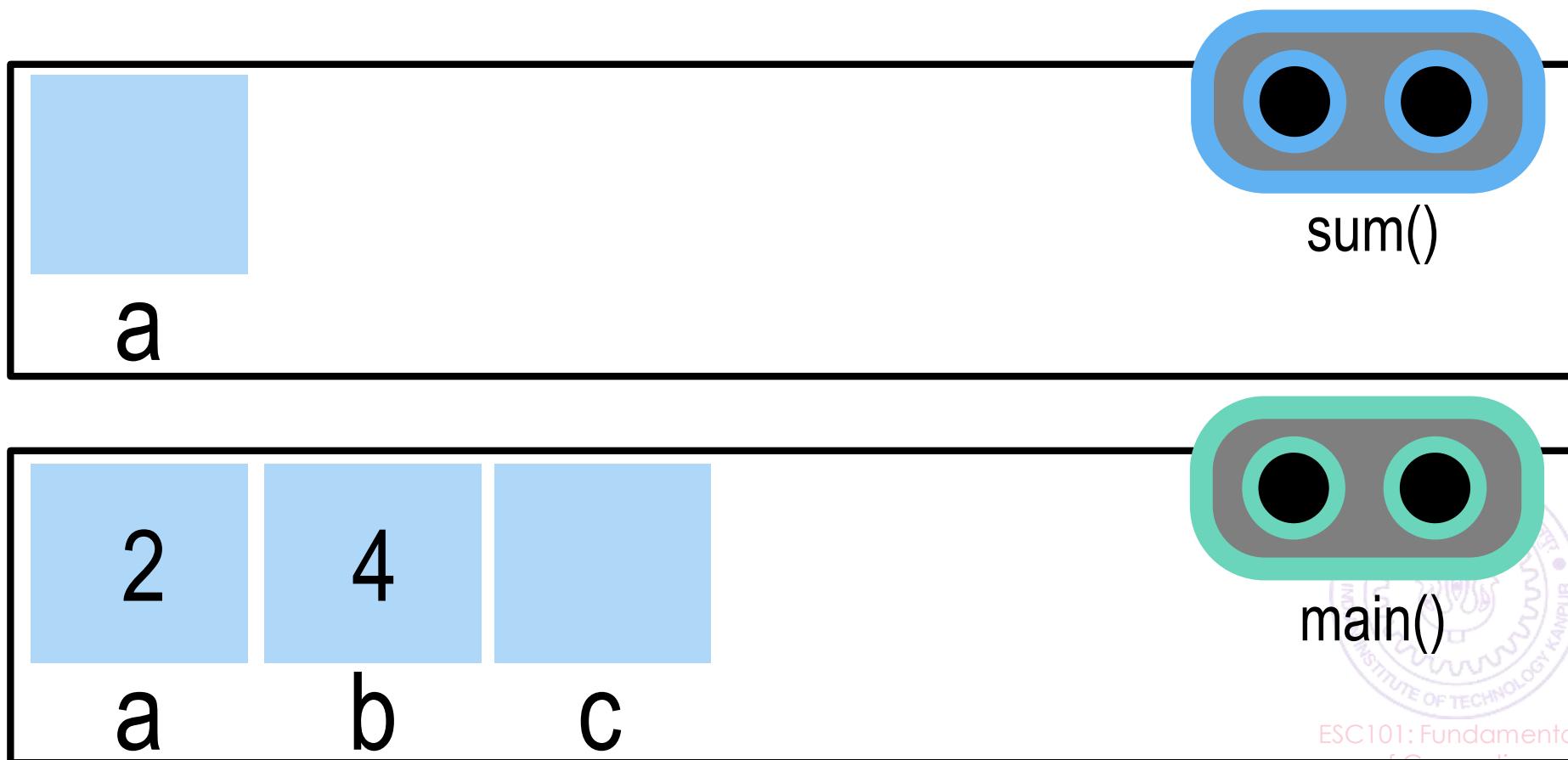
# Same function called repeatedly

```
int inc(int a){  
    return a+1;  
}  
  
int sum(int a, int b){  
    int c = inc(a) + inc(b);  
    return c;  
}  
  
int main(void){  
    int a = 2, b = 4, c;  
    c = sum(a, b);  
    printf("%d", c);  
    return 0;  
}
```



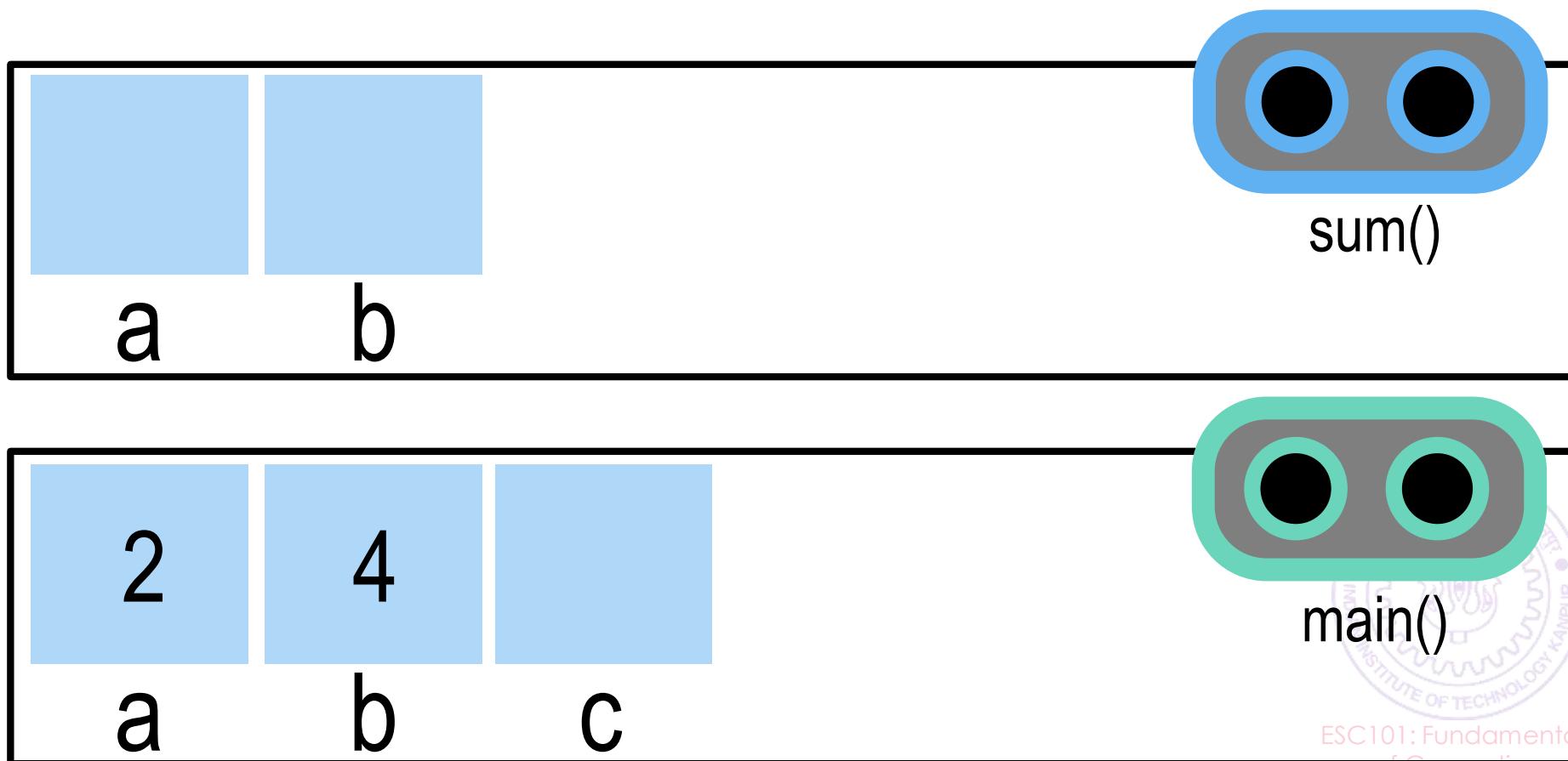
# Same function called repeatedly

```
int inc(int a){  
    return a+1;  
}  
  
int sum(int a, int b){  
    int c = inc(a) + inc(b);  
    return c;  
}  
  
int main(void){  
    int a = 2, b = 4, c;  
    c = sum(a, b);  
    printf("%d", c);  
    return 0;  
}
```



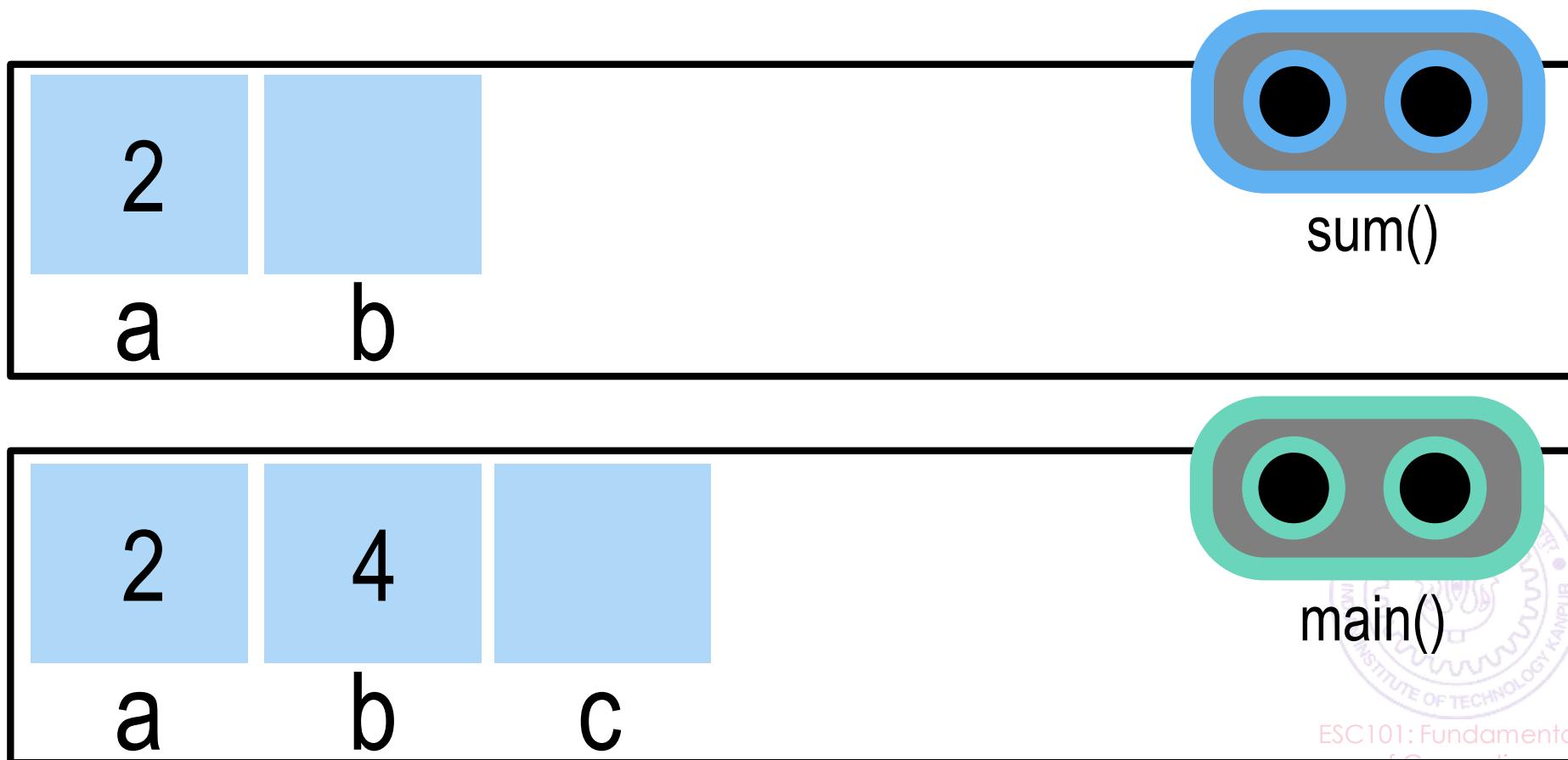
# Same function called repeatedly

```
int inc(int a){  
    return a+1;  
}  
  
int sum(int a, int b){  
    int c = inc(a) + inc(b);  
    return c;  
}  
  
int main(void){  
    int a = 2, b = 4, c;  
    c = sum(a, b);  
    printf("%d", c);  
    return 0;  
}
```



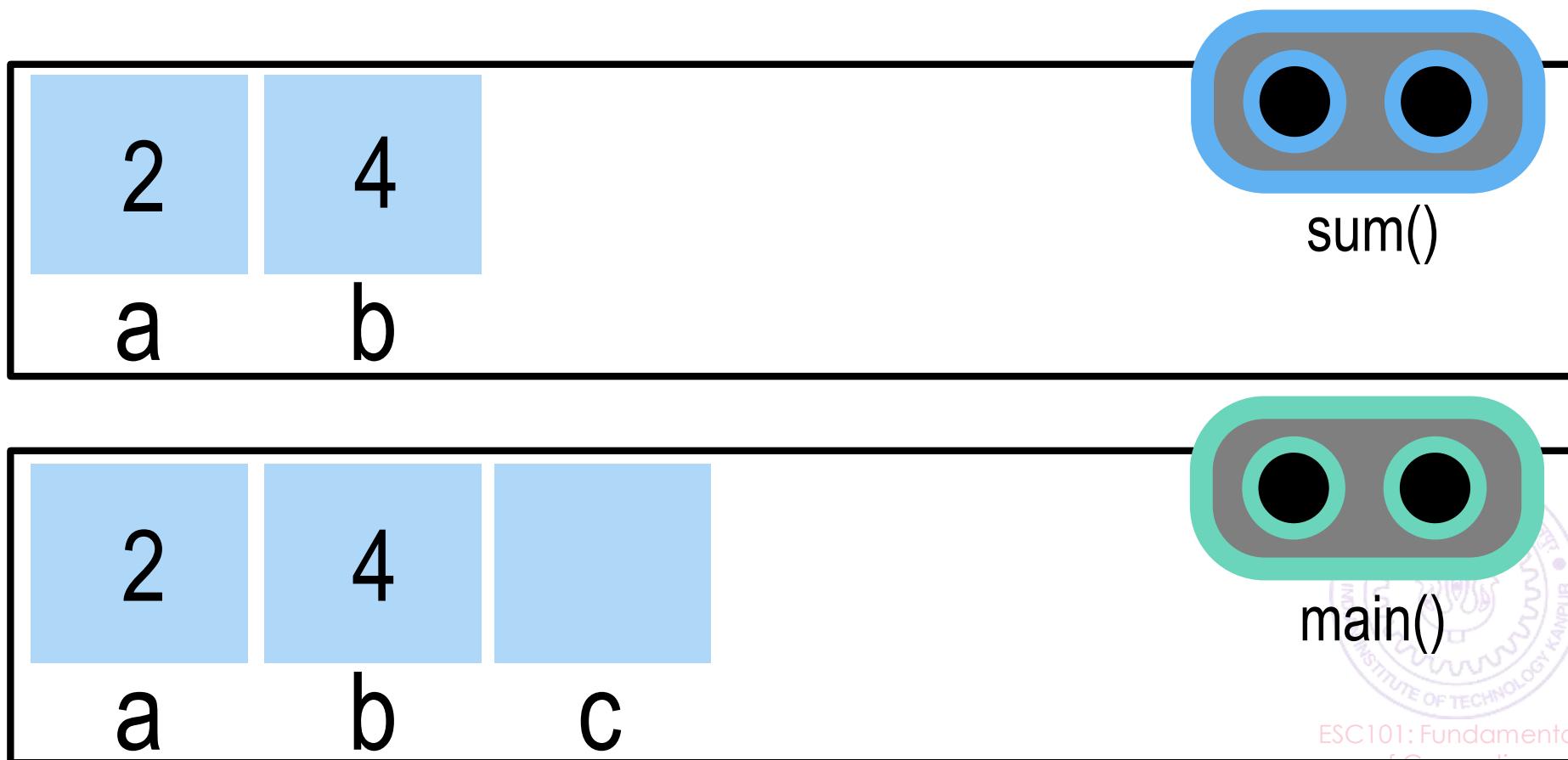
# Same function called repeatedly

```
int inc(int a){  
    return a+1;  
}  
  
int sum(int a, int b){  
    int c = inc(a) + inc(b);  
    return c;  
}  
  
int main(void){  
    int a = 2, b = 4, c;  
    c = sum(a, b);  
    printf("%d", c);  
    return 0;  
}
```



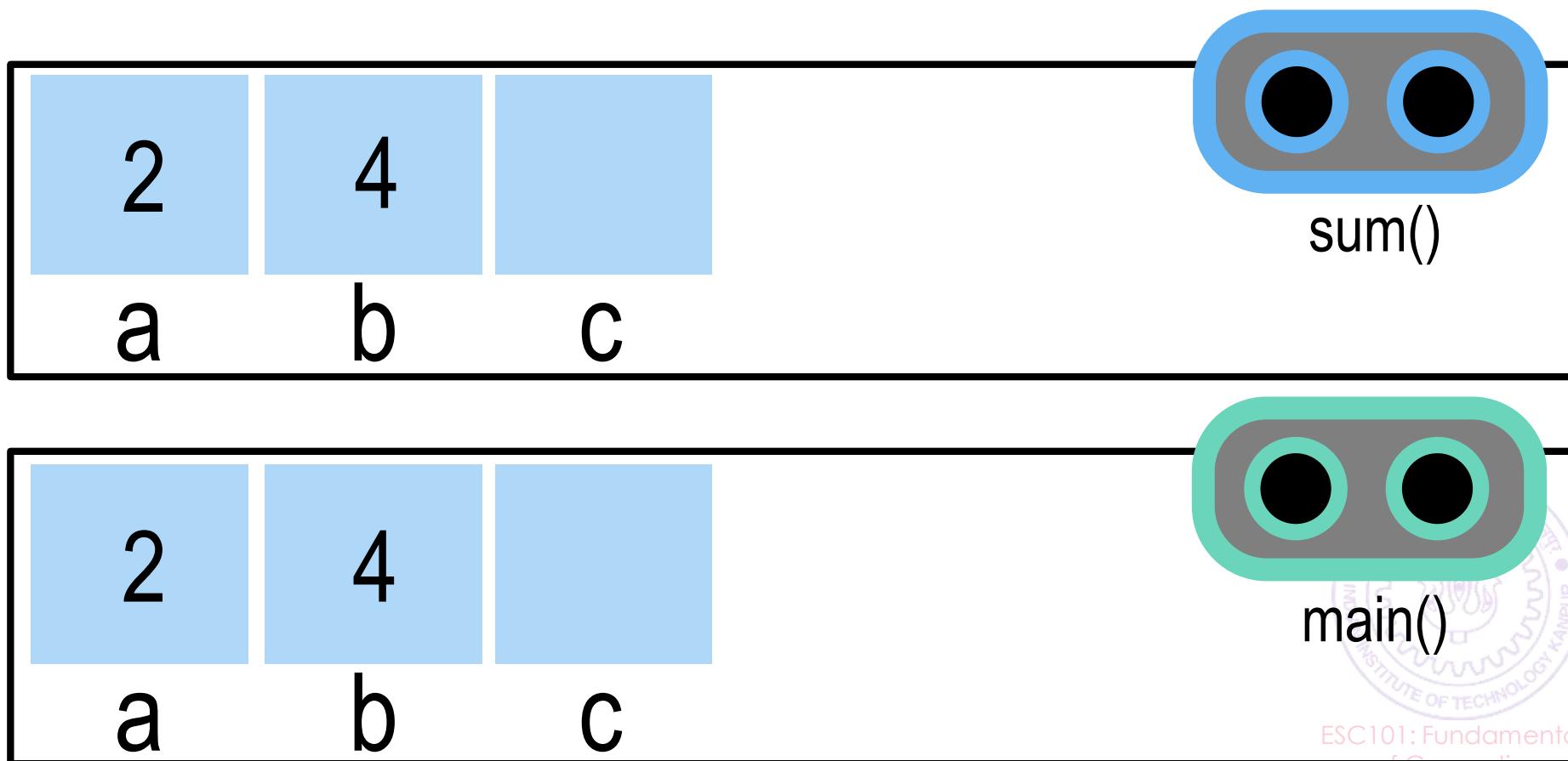
# Same function called repeatedly

```
int inc(int a){  
    return a+1;  
}  
  
int sum(int a, int b){  
    int c = inc(a) + inc(b);  
    return c;  
}  
  
int main(void){  
    int a = 2, b = 4, c;  
    c = sum(a, b);  
    printf("%d", c);  
    return 0;  
}
```



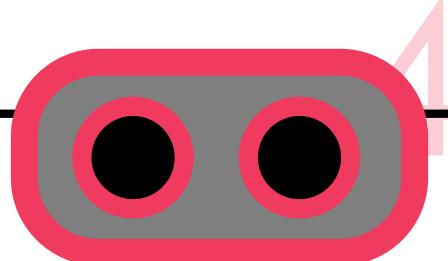
# Same function called repeatedly

```
int inc(int a){  
    return a+1;  
}  
  
int sum(int a, int b){  
    int c = inc(a) + inc(b);  
    return c;  
}  
  
int main(void){  
    int a = 2, b = 4, c;  
    c = sum(a, b);  
    printf("%d", c);  
    return 0;  
}
```



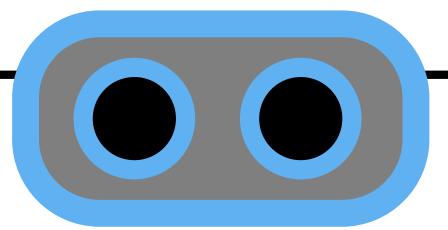
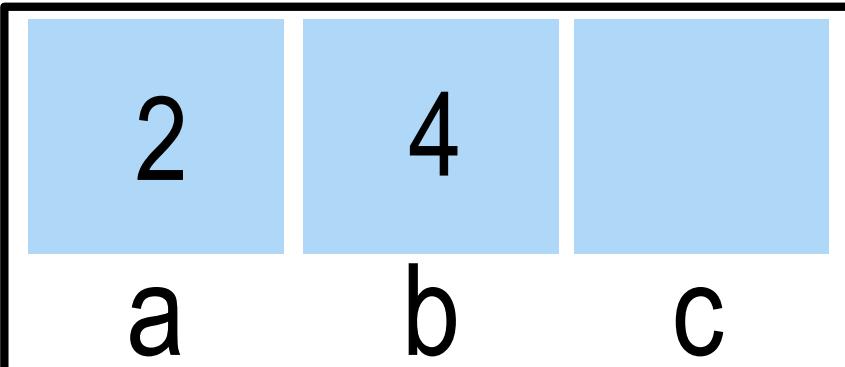
# Same function called repeatedly

```
int inc(int a){  
    return a+1;  
}
```



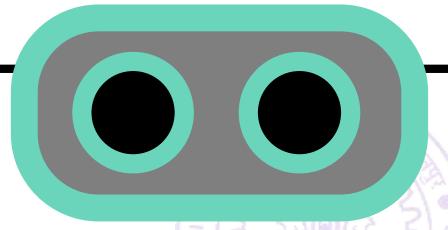
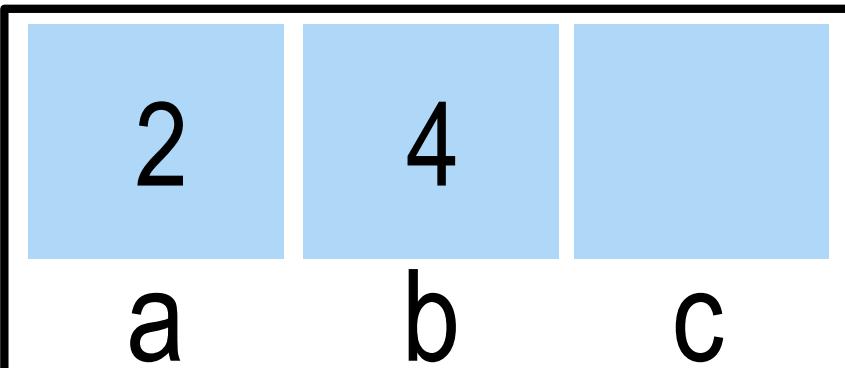
inc()

```
int sum(int a, int b){  
    int c = inc(a) + inc(b);  
    return c;  
}
```



sum()

```
int main(void){  
    int a = 2, b = 4, c;  
    c = sum(a, b);  
    printf("%d", c);  
    return 0;  
}
```



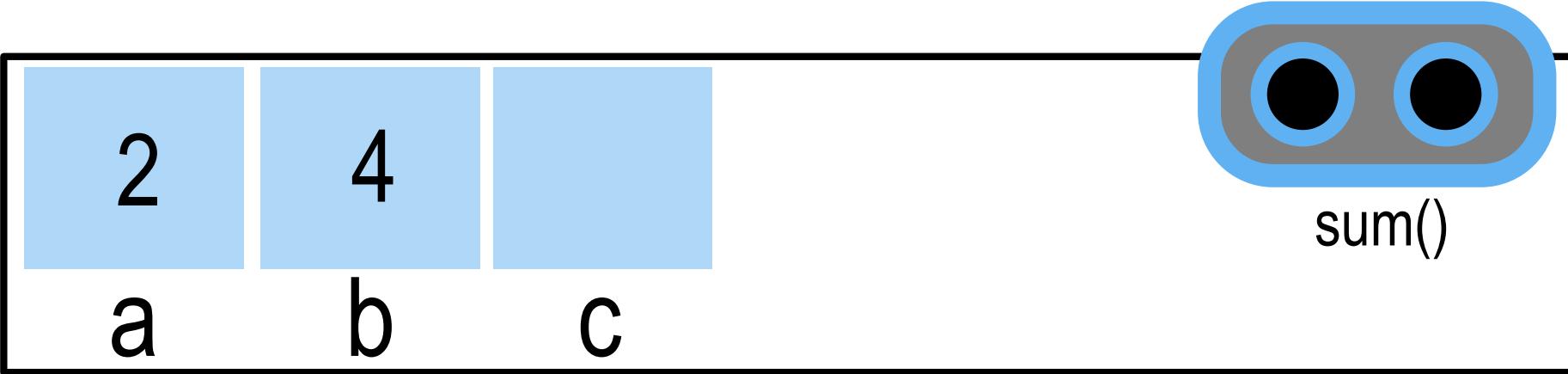
main()

# Same function called repeatedly

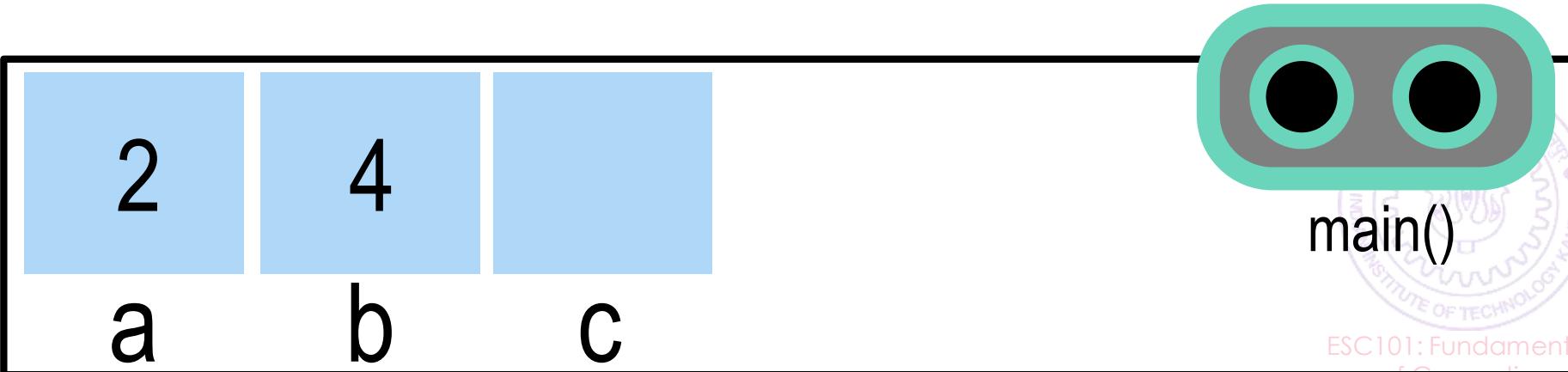
```
int inc(int a){  
    return a+1;  
}
```



```
int sum(int a, int b){  
    int c = inc(a) + inc(b);  
    return c;  
}
```



```
int main(void){  
    int a = 2, b = 4, c;  
    c = sum(a, b);  
    printf("%d", c);  
    return 0;  
}
```

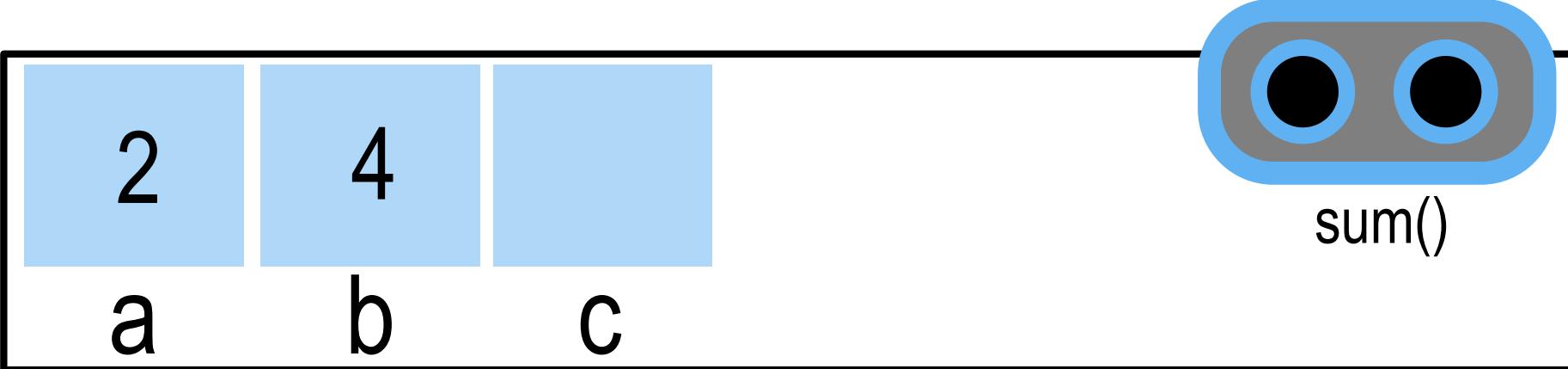


# Same function called repeatedly

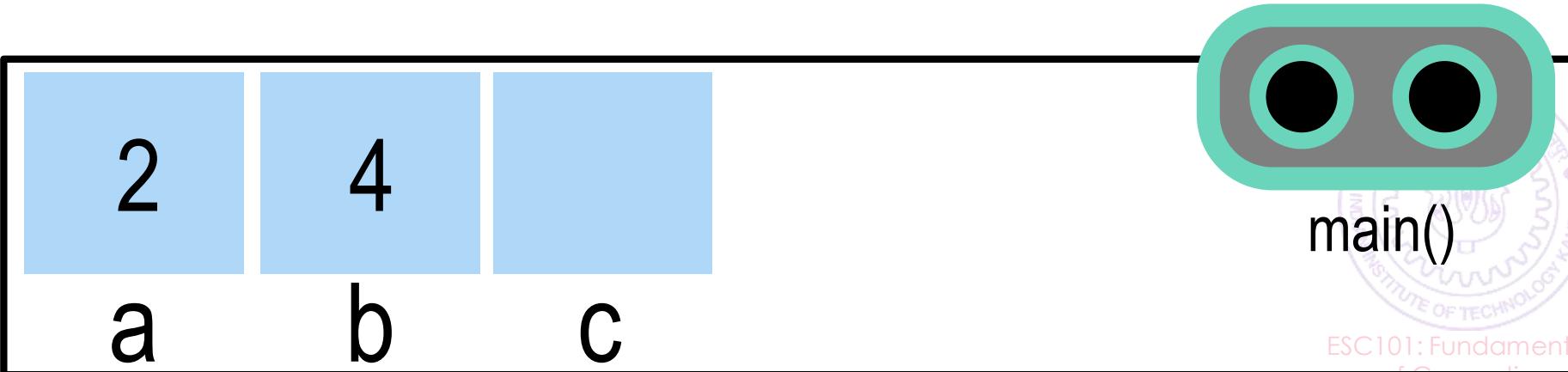
```
int inc(int a){  
    return a+1;  
}
```



```
int sum(int a, int b){  
    int c = inc(a) + inc(b);  
    return c;  
}
```



```
int main(void){  
    int a = 2, b = 4, c;  
    c = sum(a, b);  
    printf("%d", c);  
    return 0;  
}
```



# Same function called repeatedly

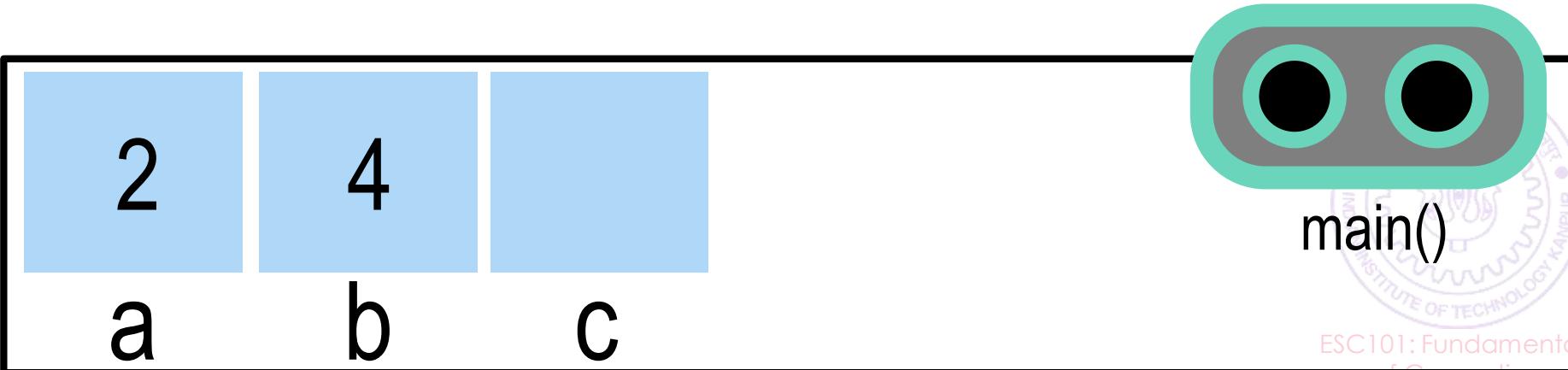
```
int inc(int a){  
    return a+1;  
}
```



```
int sum(int a, int b){  
    int c = inc(a) + inc(b);  
    return c;  
}
```

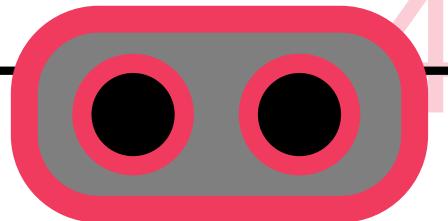
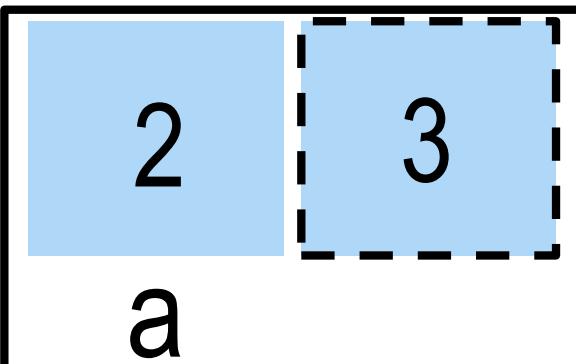


```
int main(void){  
    int a = 2, b = 4, c;  
    c = sum(a, b);  
    printf("%d", c);  
    return 0;  
}
```



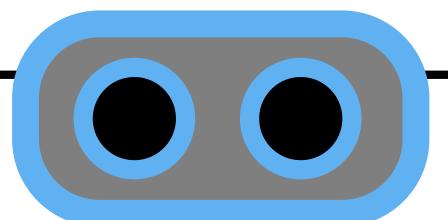
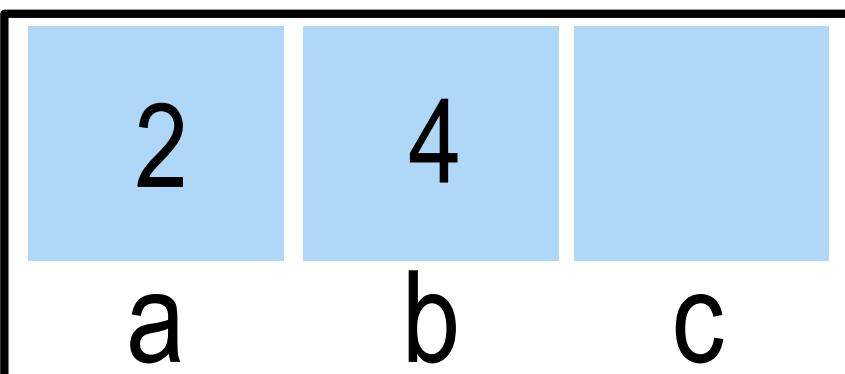
# Same function called repeatedly

```
int inc(int a){  
    return a+1;  
}
```



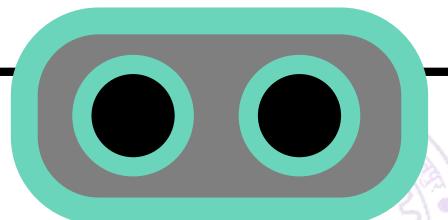
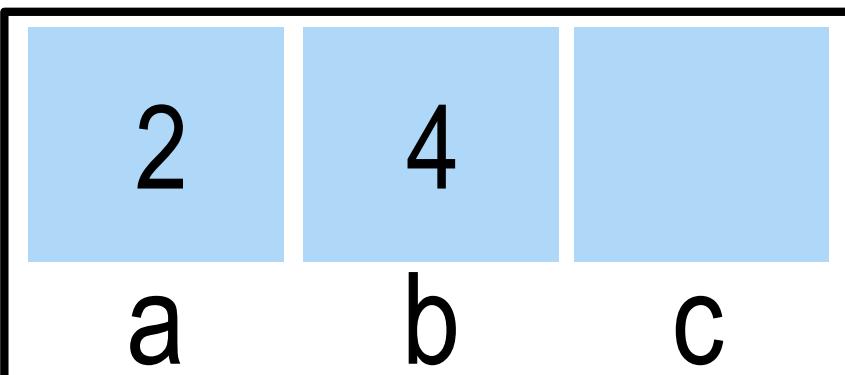
inc()

```
int sum(int a, int b){  
    int c = inc(a) + inc(b);  
    return c;  
}
```



sum()

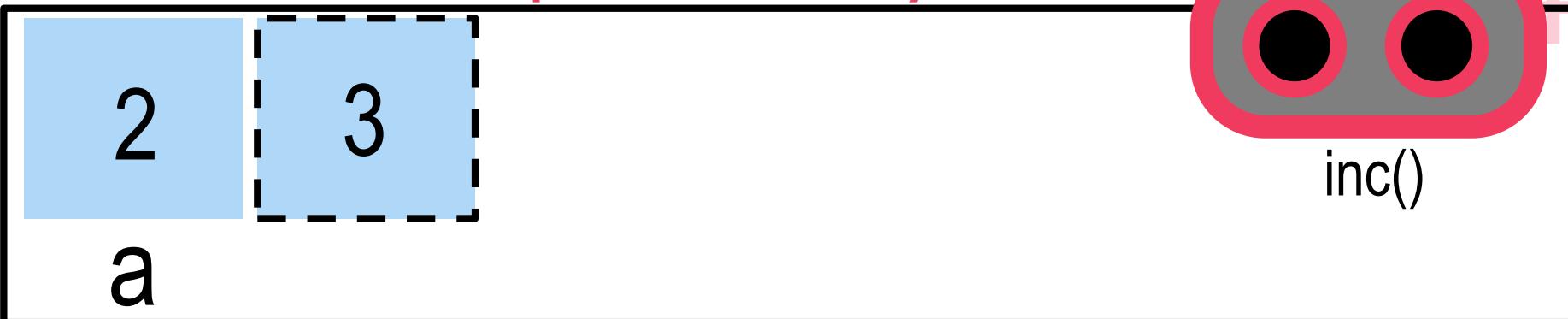
```
int main(void){  
    int a = 2, b = 4, c;  
    c = sum(a, b);  
    printf("%d", c);  
    return 0;  
}
```



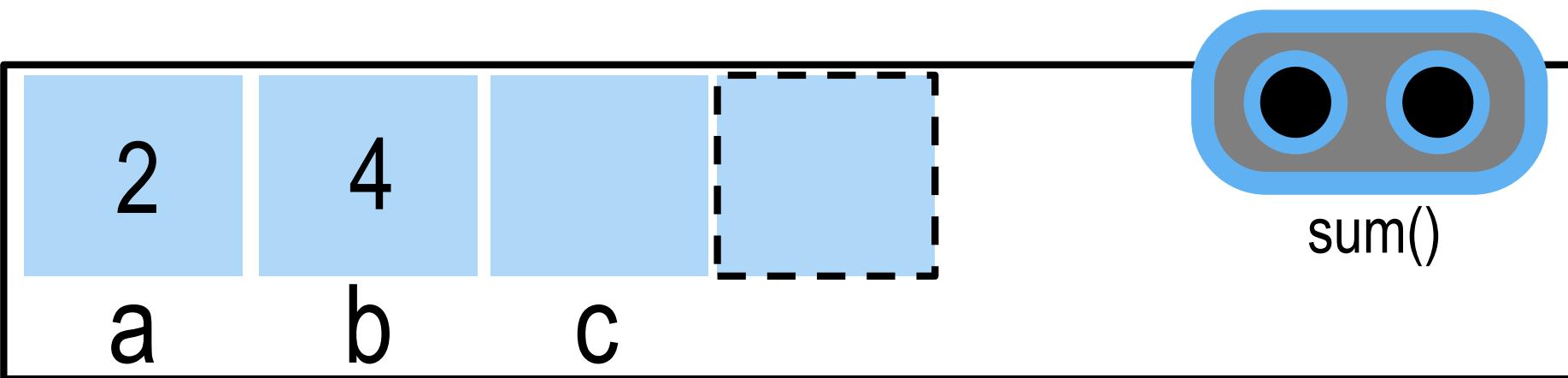
main()

# Same function called repeatedly

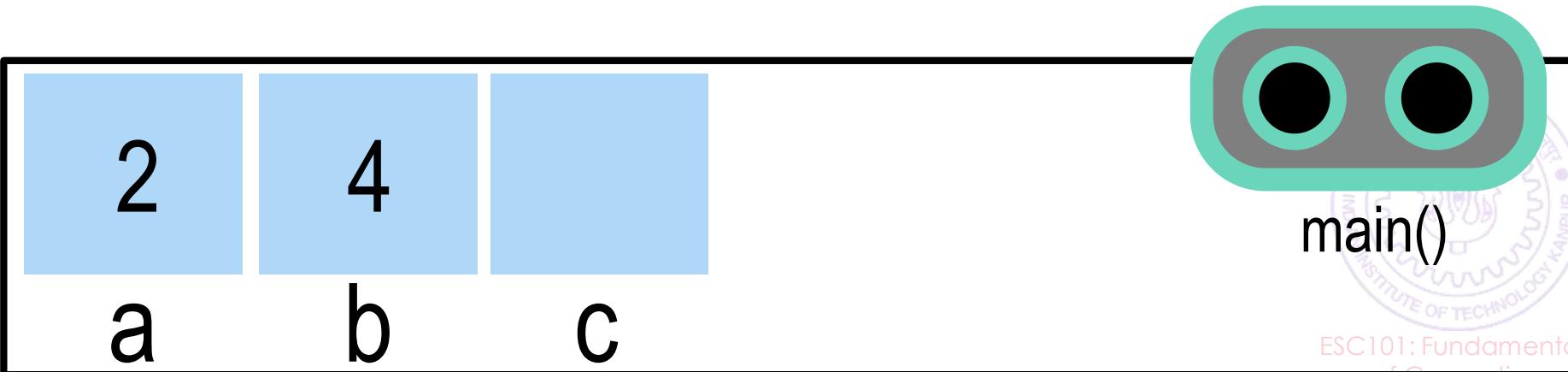
```
int inc(int a){  
    return a+1;  
}
```



```
int sum(int a, int b){  
    int c = inc(a) + inc(b);  
    return c;  
}
```

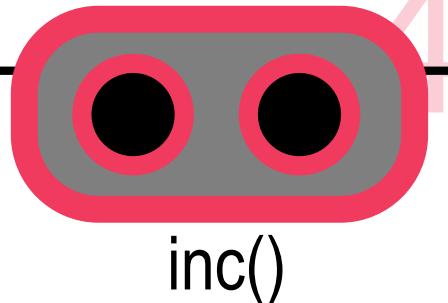
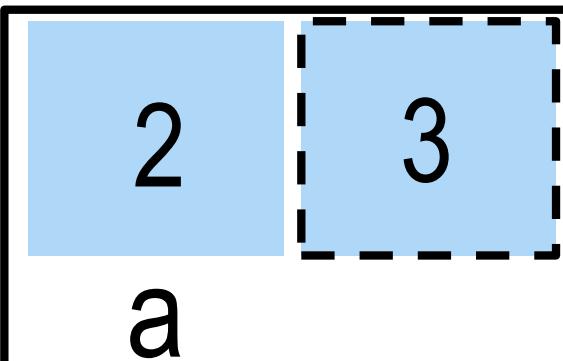


```
int main(void){  
    int a = 2, b = 4, c;  
    c = sum(a, b);  
    printf("%d", c);  
    return 0;  
}
```



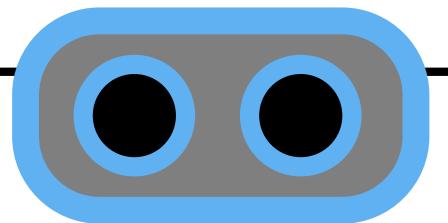
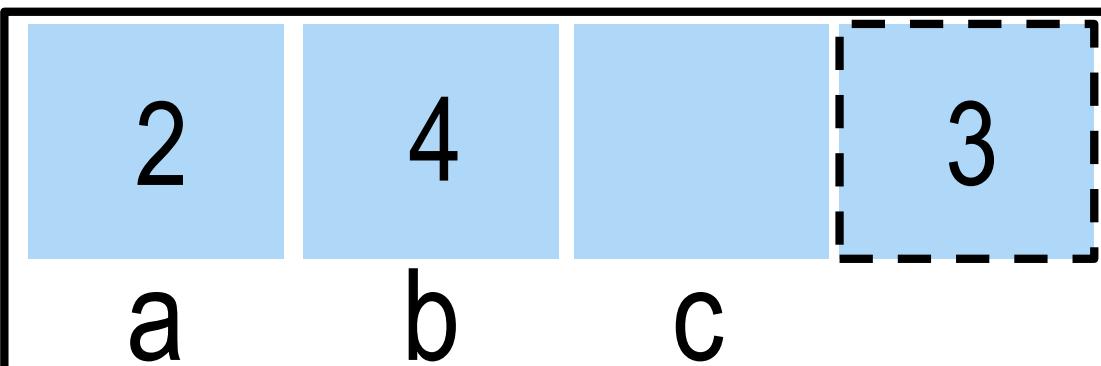
# Same function called repeatedly

```
int inc(int a){  
    return a+1;  
}
```



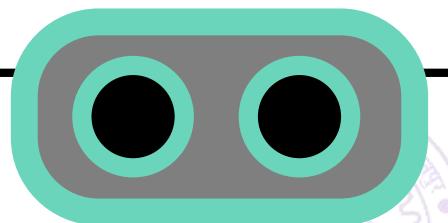
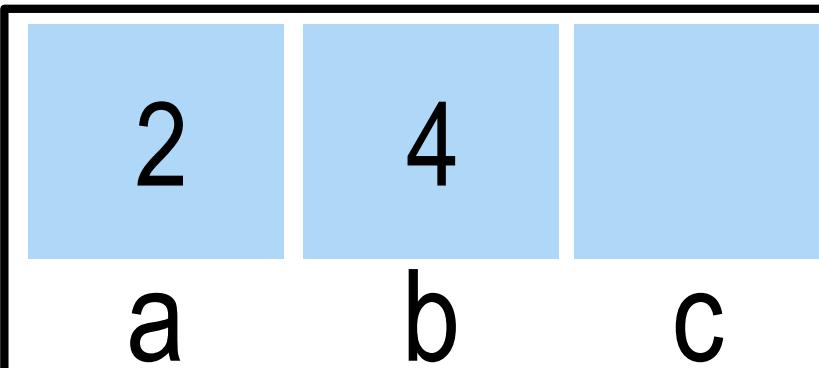
inc()

```
int sum(int a, int b){  
    int c = inc(a) + inc(b);  
    return c;  
}
```



sum()

```
int main(void){  
    int a = 2, b = 4, c;  
    c = sum(a, b);  
    printf("%d", c);  
    return 0;  
}
```



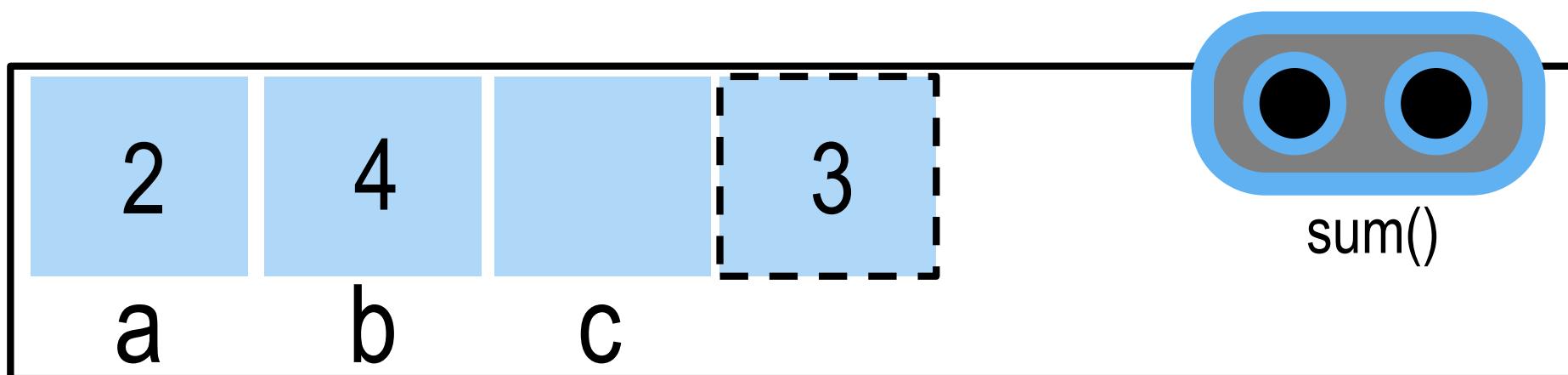
main()

# Same function called repeatedly

```
int inc(int a){  
    return a+1;  
}
```

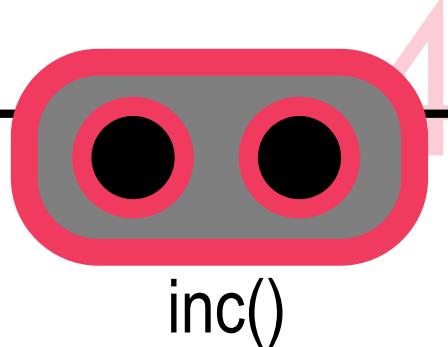
```
int sum(int a, int b){  
    int c = inc(a) + inc(b);  
    return c;  
}
```

```
int main(void){  
    int a = 2, b = 4, c;  
    c = sum(a, b);  
    printf("%d", c);  
    return 0;  
}
```

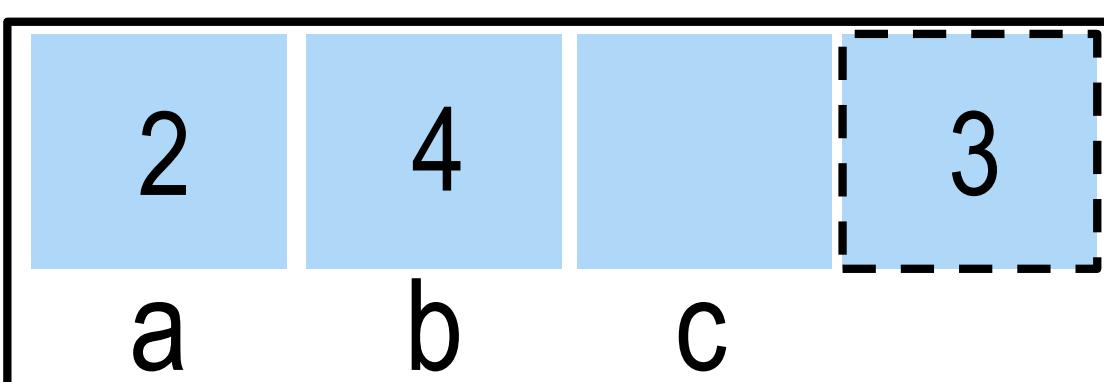


# Same function called repeatedly

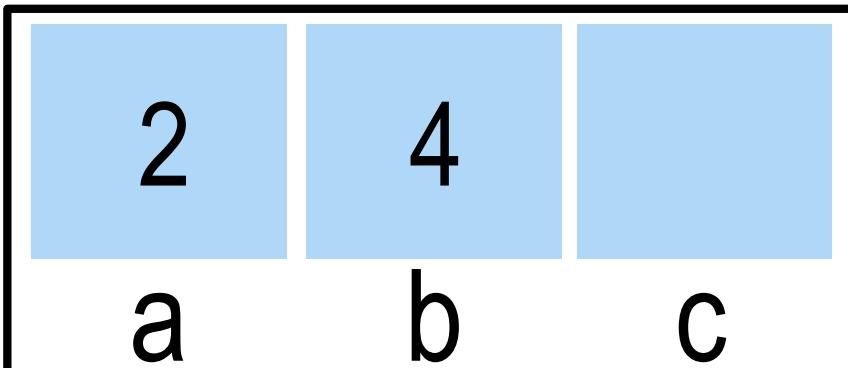
```
int inc(int a){  
    return a+1;  
}
```



```
int sum(int a, int b){  
    int c = inc(a) + inc(b);  
    return c;  
}
```

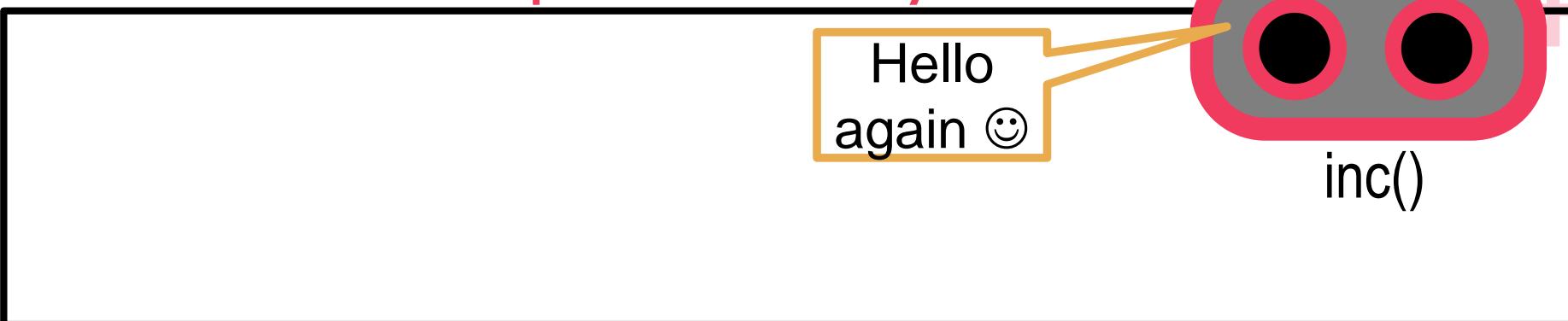


```
int main(void){  
    int a = 2, b = 4, c;  
    c = sum(a, b);  
    printf("%d", c);  
    return 0;  
}
```

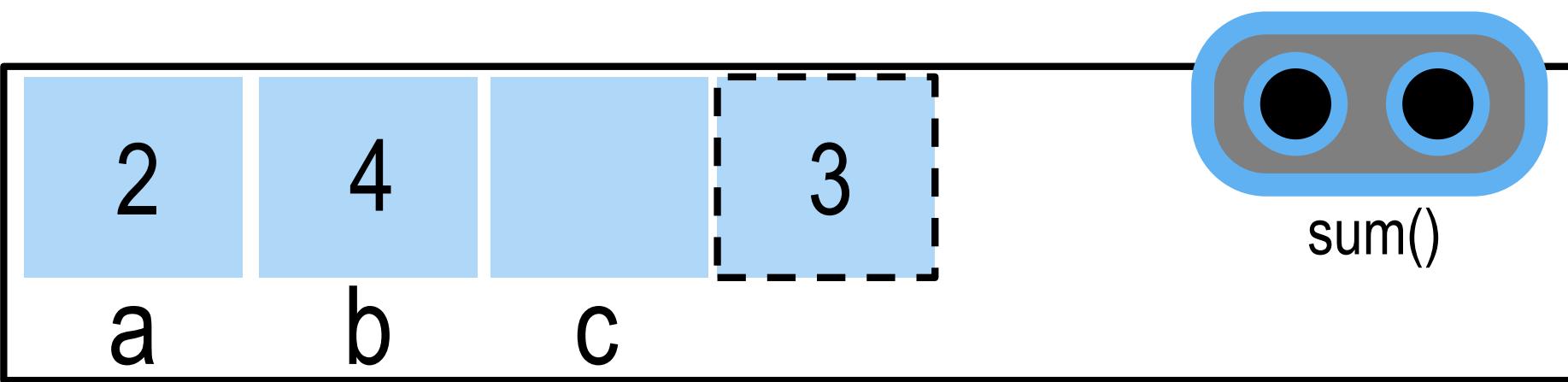


# Same function called repeatedly

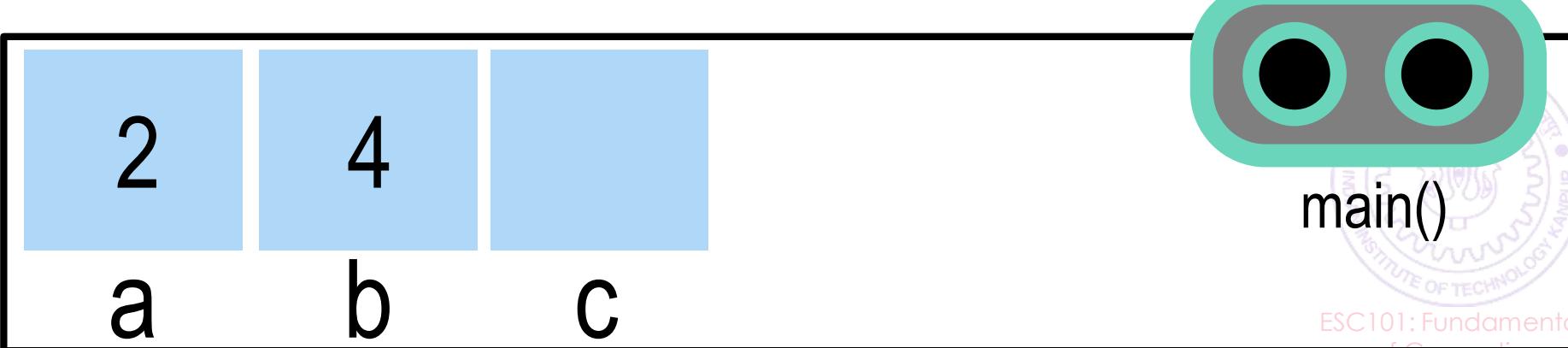
```
int inc(int a){  
    return a+1;  
}
```



```
int sum(int a, int b){  
    int c = inc(a) + inc(b);  
    return c;  
}
```



```
int main(void){  
    int a = 2, b = 4, c;  
    c = sum(a, b);  
    printf("%d", c);  
    return 0;  
}
```

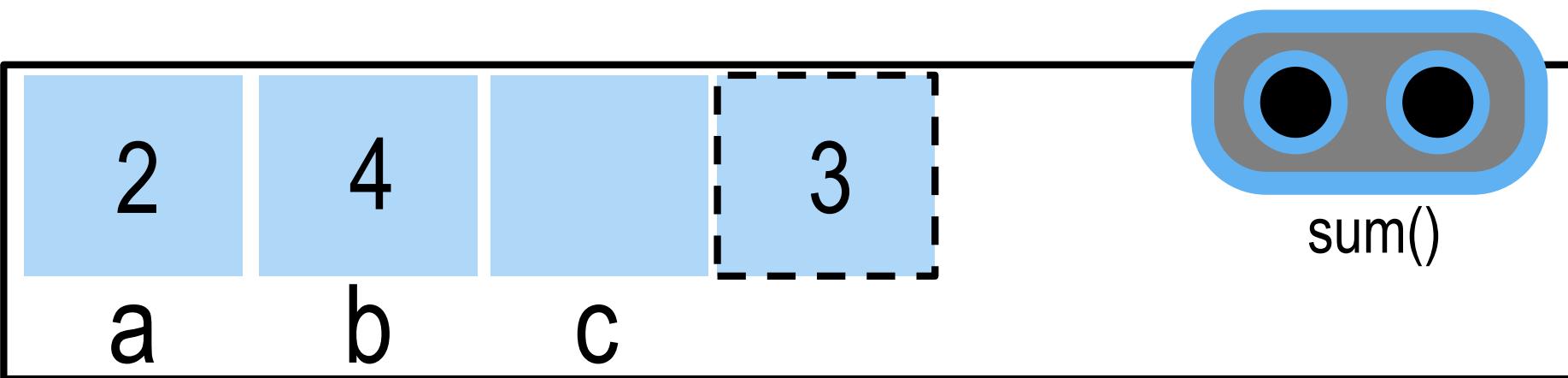


# Same function called repeatedly

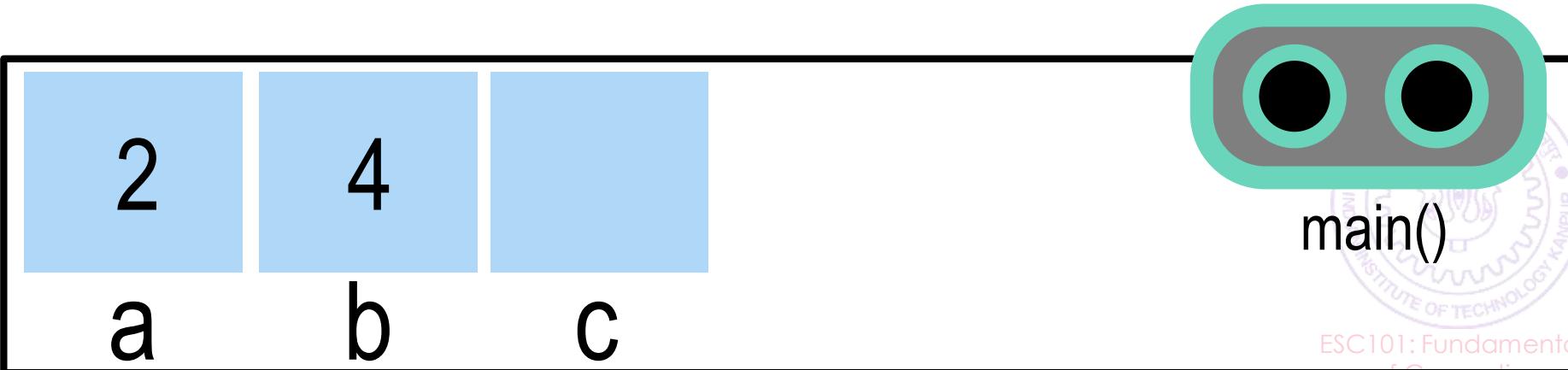
```
int inc(int a){  
    return a+1;  
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```
int sum(int a, int b){  
    int c = inc(a) + inc(b);  
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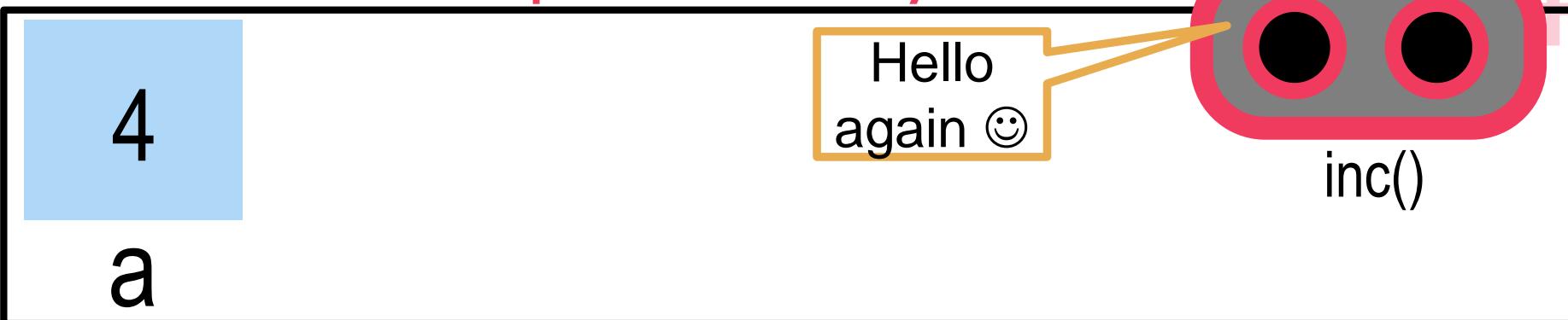


```
int main(void){  
    int a = 2, b = 4, c;  
    c = sum(a, b);  
    printf("%d", c);  
    return 0;  
}
```

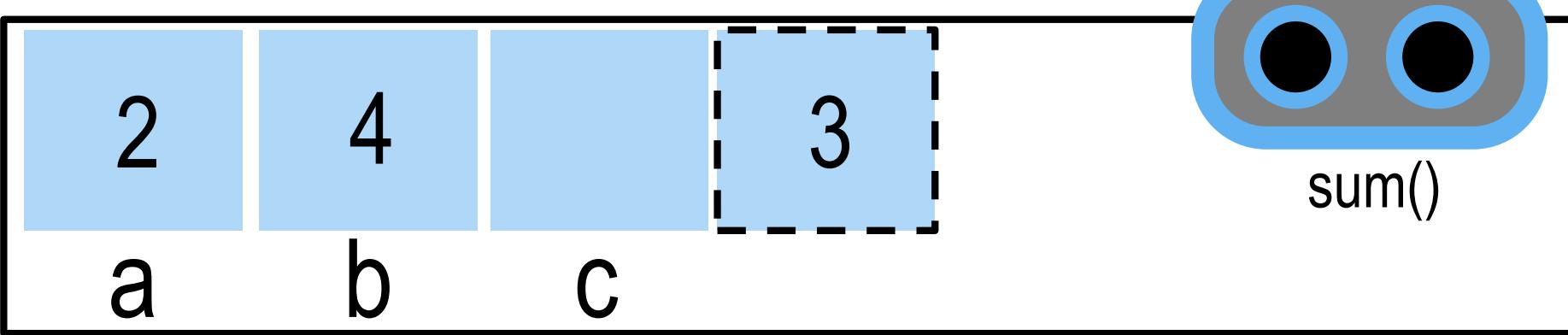


# Same function called repeatedly

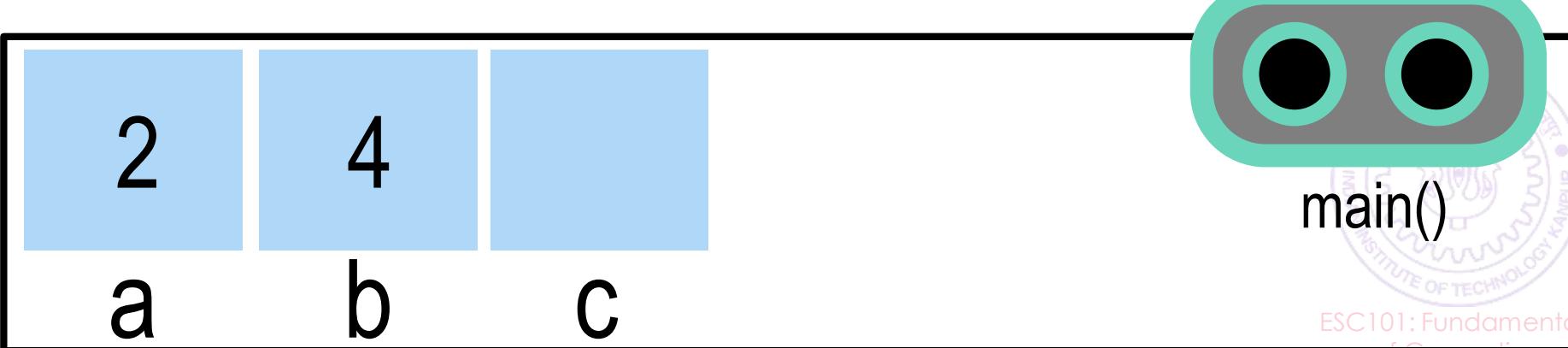
```
int inc(int a){  
    return a+1;  
}
```



```
int sum(int a, int b){  
    int c = inc(a) + inc(b);  
    return c;  
}
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```
int main(void){  
    int a = 2, b = 4, c;  
    c = sum(a, b);  
    printf("%d", c);  
    return 0;  
}
```

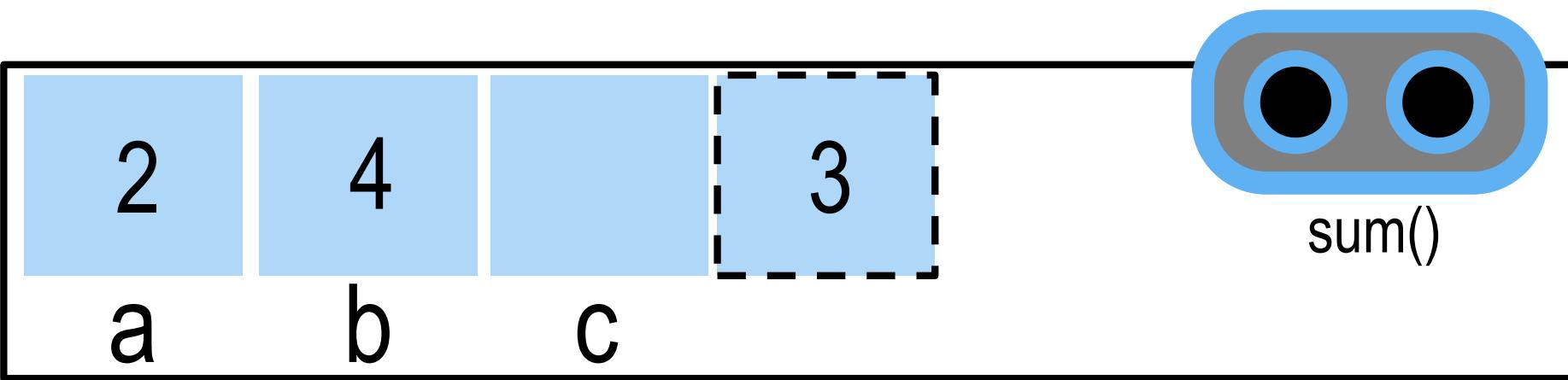


# Same function called repeatedly

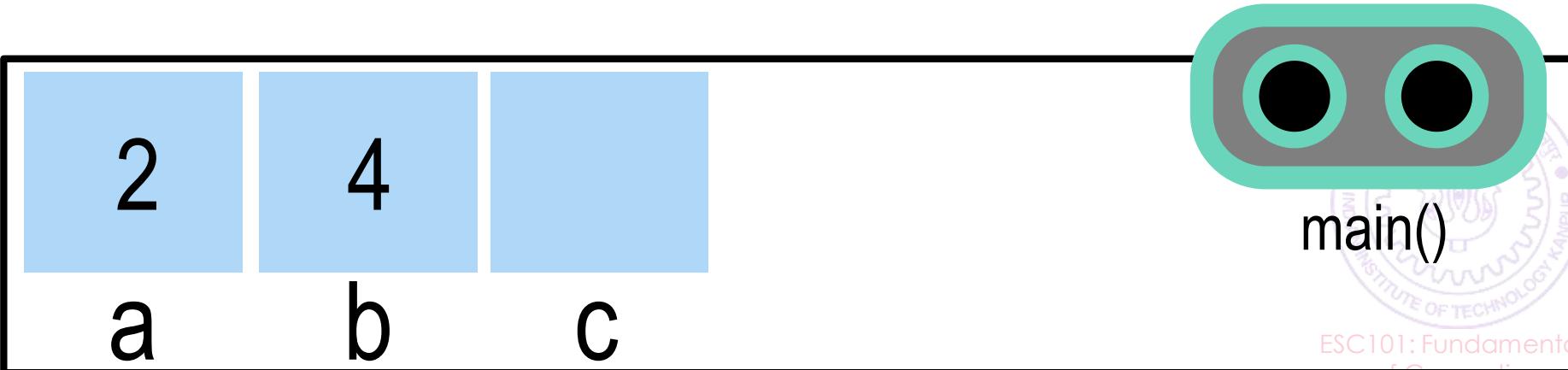
```
int inc(int a){  
    return a+1;  
}
```



```
int sum(int a, int b){  
    int c = inc(a) + inc(b);  
    return c;  
}
```

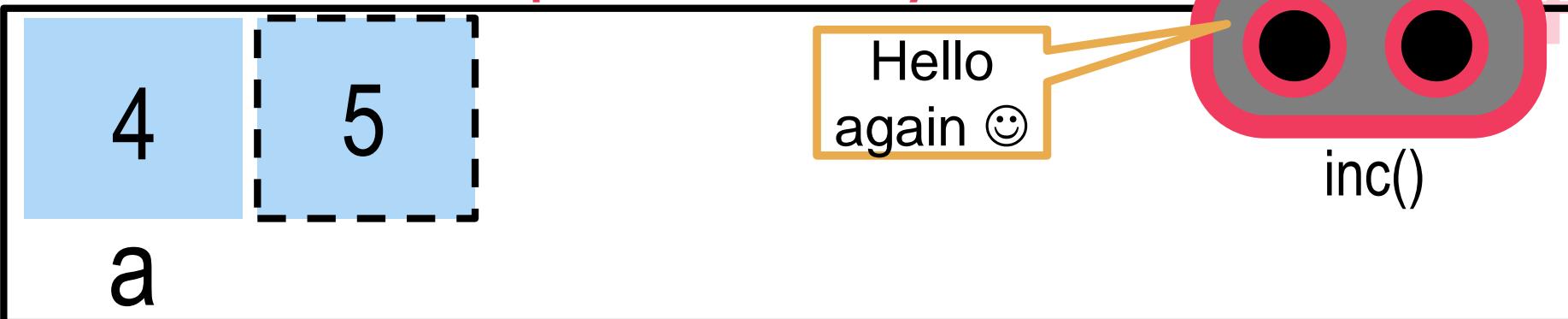


```
int main(void){  
    int a = 2, b = 4, c;  
    c = sum(a, b);  
    printf("%d", c);  
    return 0;  
}
```

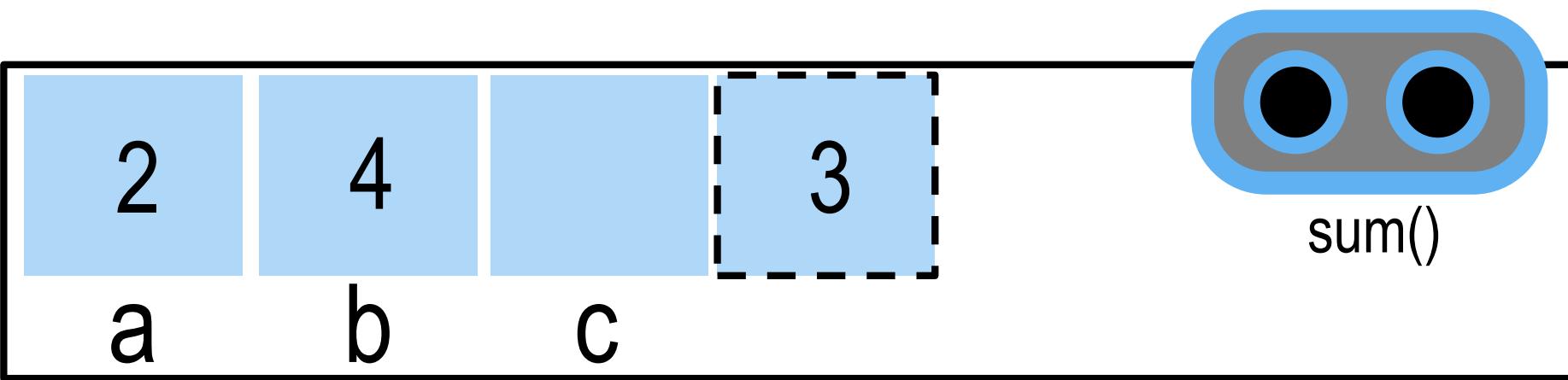


# Same function called repeatedly

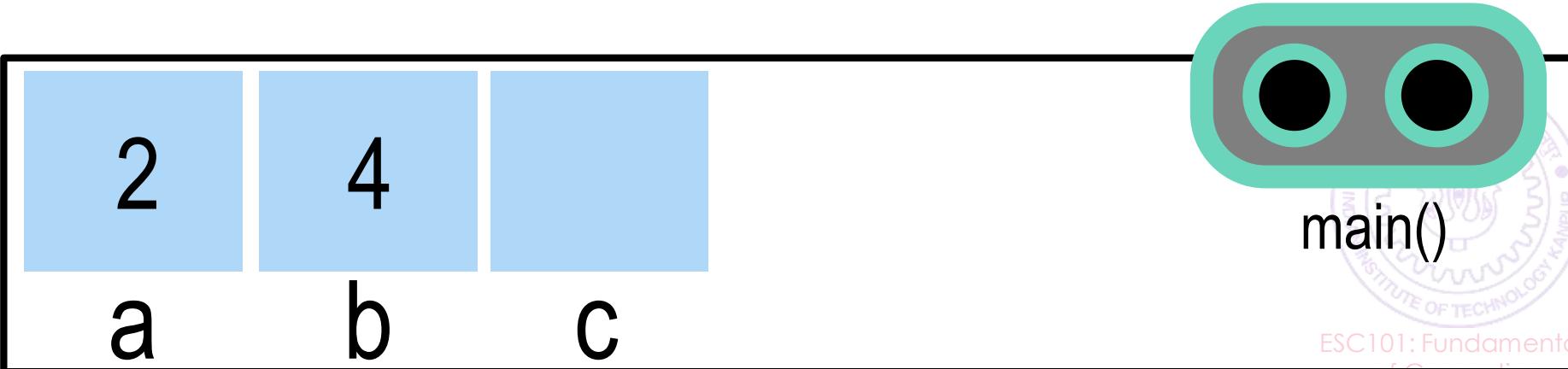
```
int inc(int a){  
    return a+1;  
}
```



```
int sum(int a, int b){  
    int c = inc(a) + inc(b);  
    return c;  
}
```

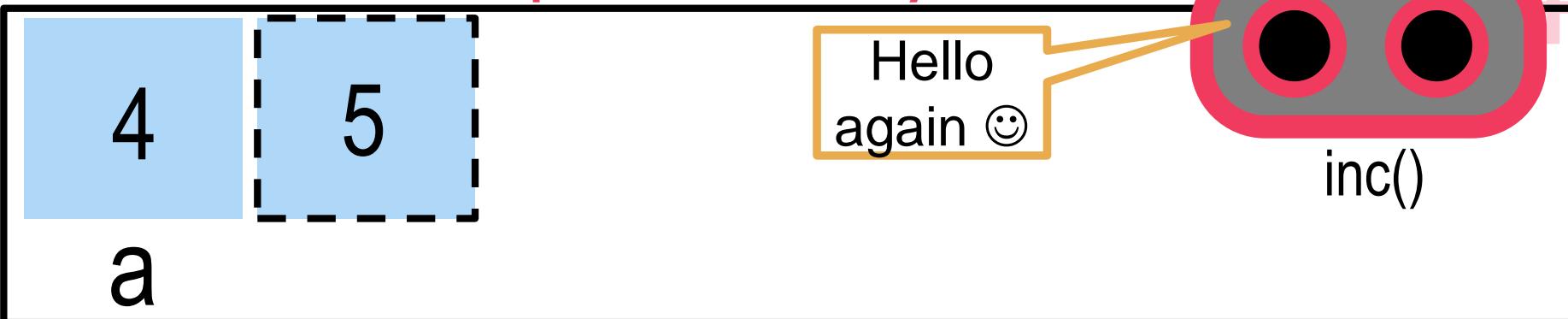


```
int main(void){  
    int a = 2, b = 4, c;  
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    printf("%d", c);  
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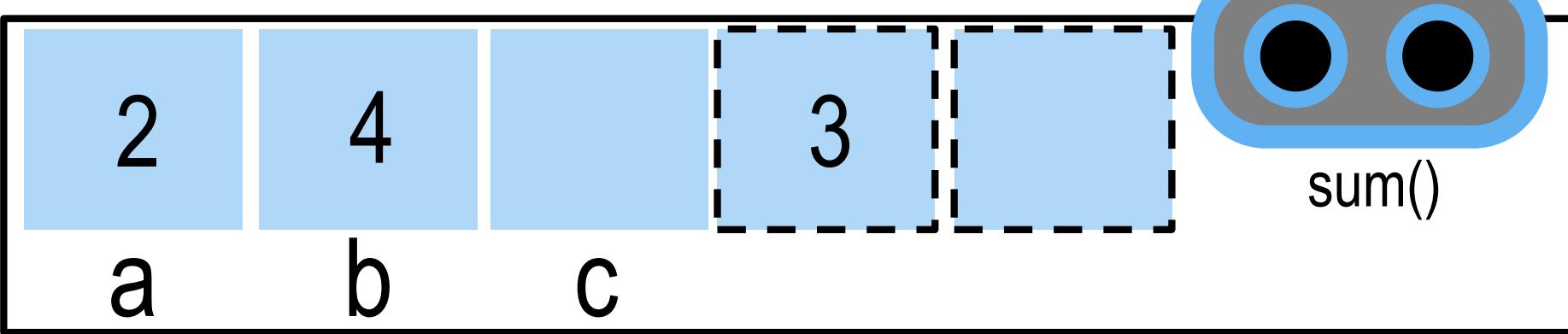


# Same function called repeatedly

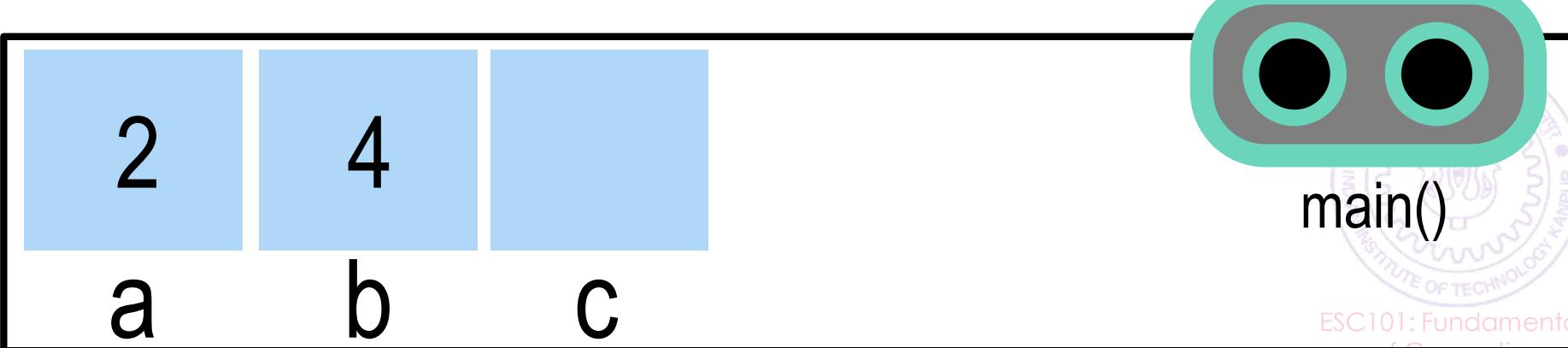
```
int inc(int a){  
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int sum(int a, int b){  
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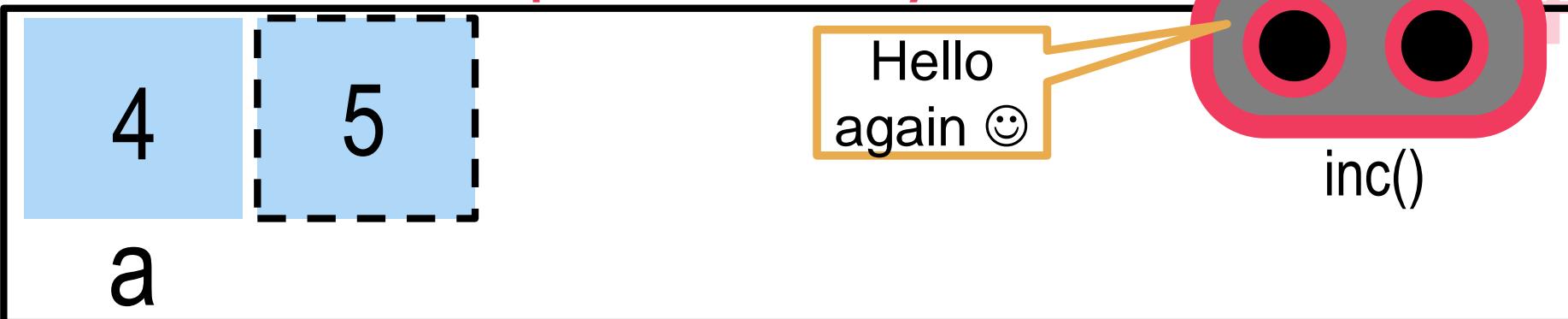


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int main(void){  
    int a = 2, b = 4, c;  
    c = sum(a, b);  
    printf("%d", c);  
    return 0;  
}
```

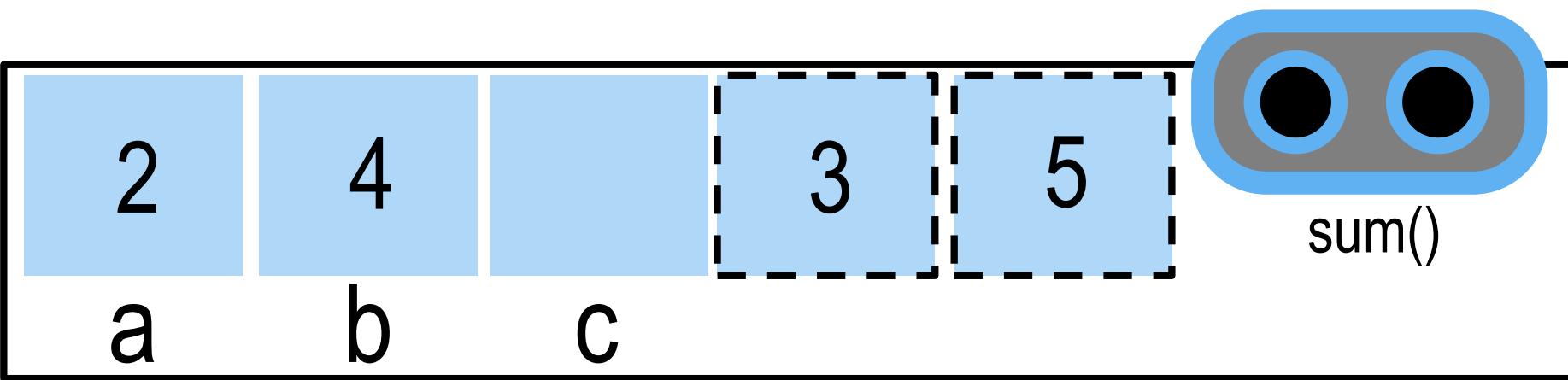


# Same function called repeatedly

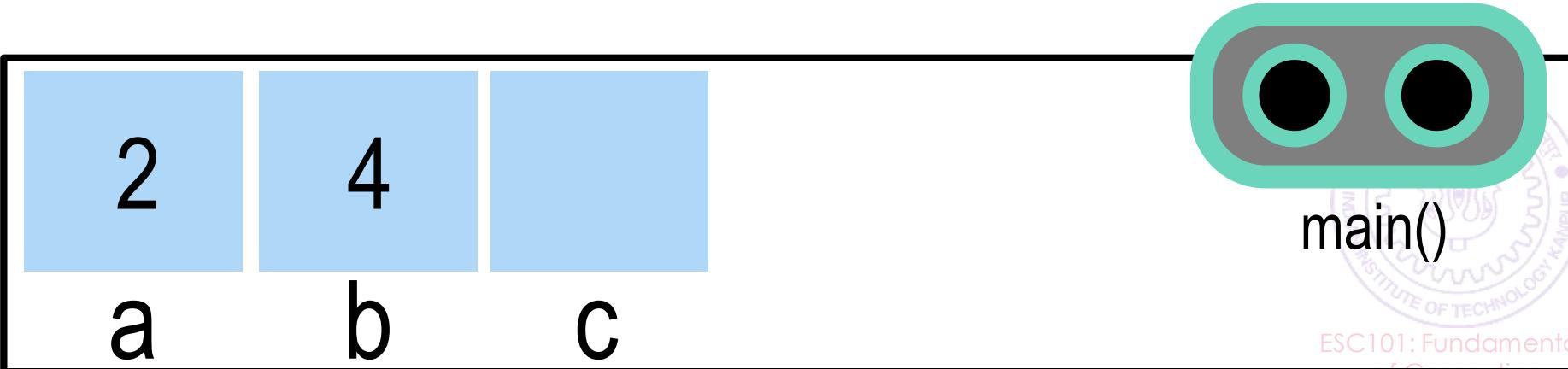
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int inc(int a){  
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```
int sum(int a, int b){  
    int c = inc(a) + inc(b);  
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int main(void){  
    int a = 2, b = 4, c;  
    c = sum(a, b);  
    printf("%d", c);  
    return 0;  
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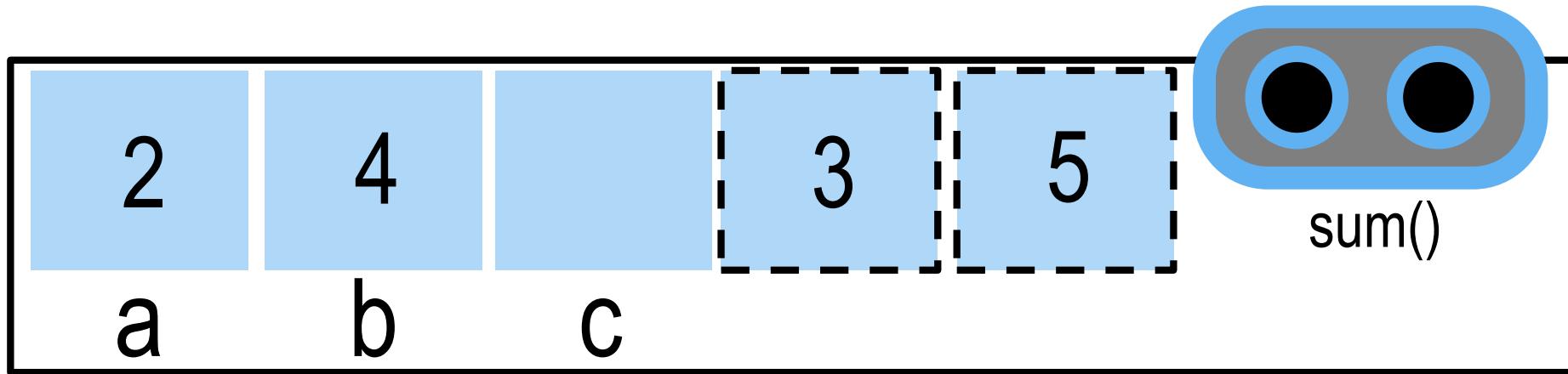


# Same function called repeatedly

```
int inc(int a){  
    return a+1;  
}
```



```
int sum(int a, int b){  
    int c = inc(a) + inc(b);  
    return c;  
}
```

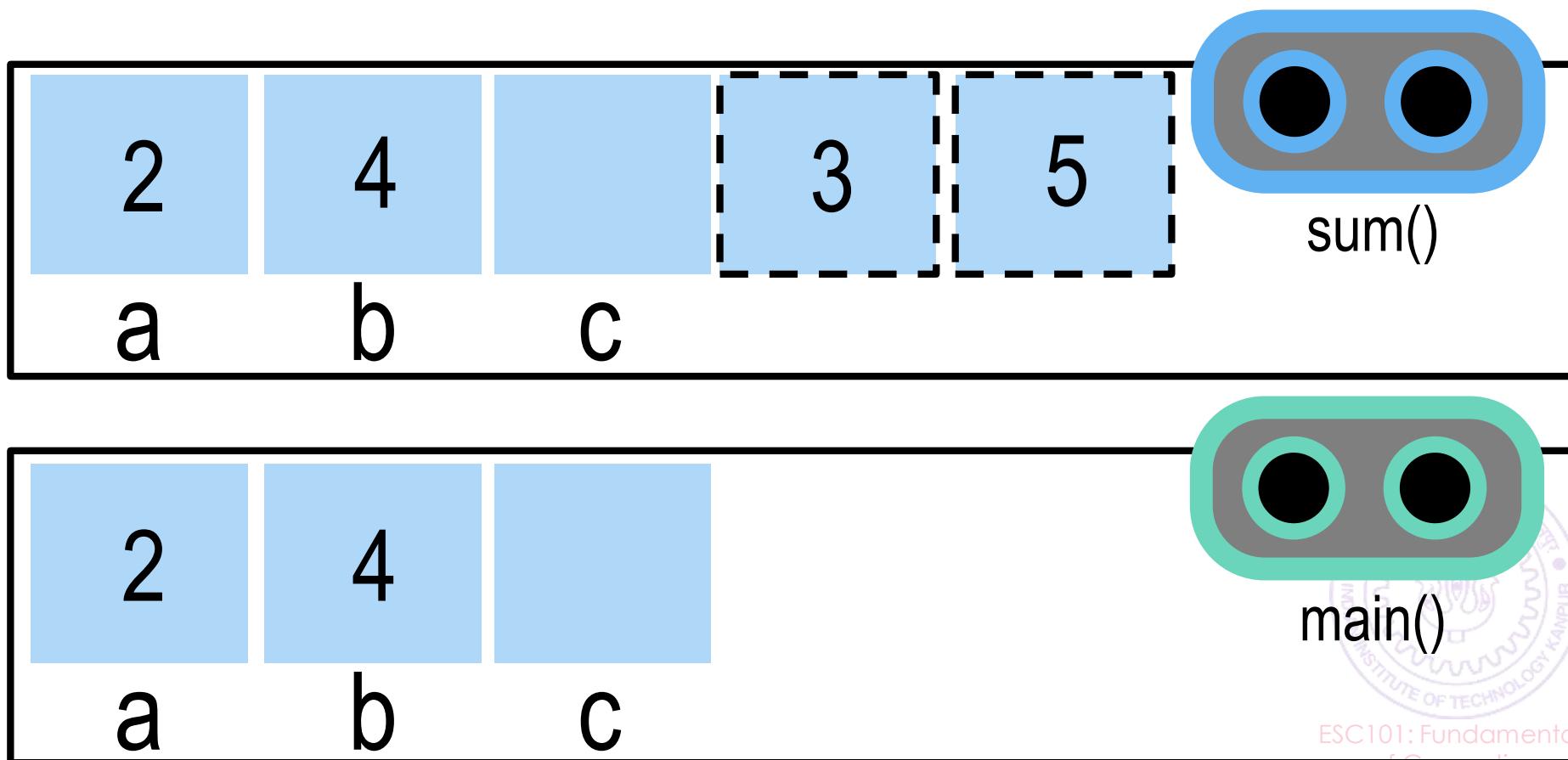


```
int main(void){  
    int a = 2, b = 4, c;  
    c = sum(a, b);  
    printf("%d", c);  
    return 0;  
}
```



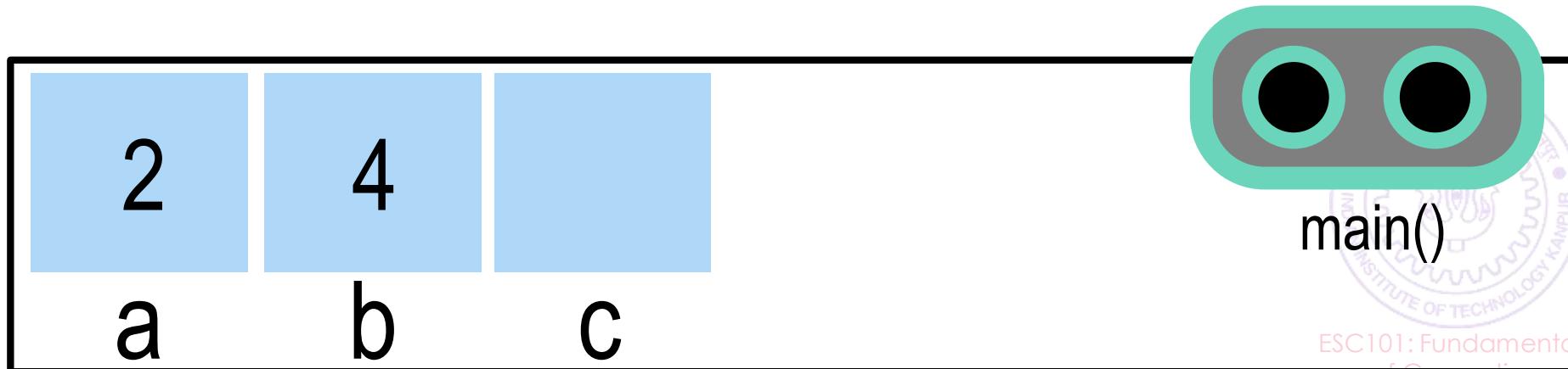
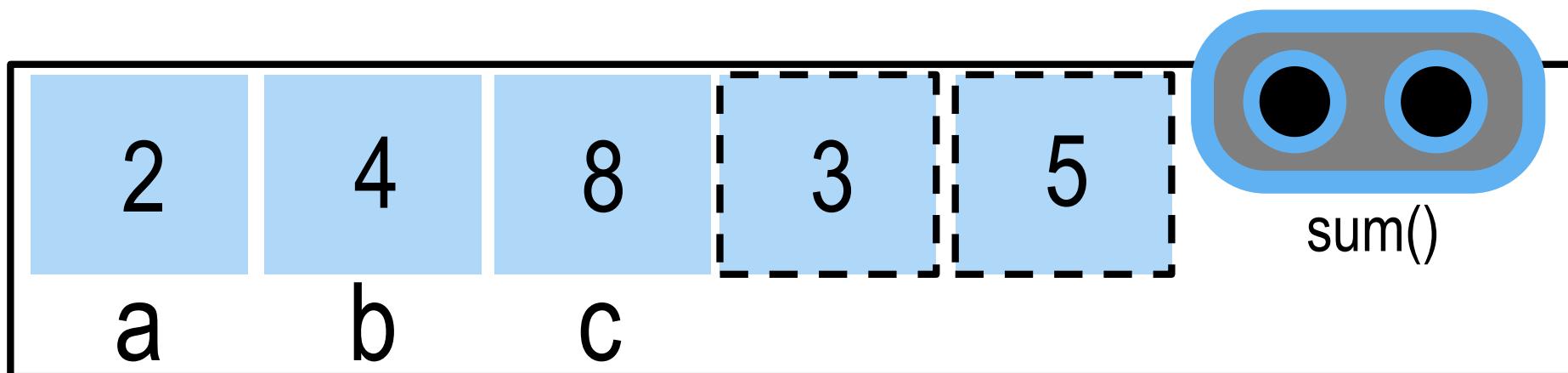
# Same function called repeatedly

```
int inc(int a){  
    return a+1;  
}  
  
int sum(int a, int b){  
    int c = inc(a) + inc(b);  
    return c;  
}  
  
int main(void){  
    int a = 2, b = 4, c;  
    c = sum(a, b);  
    printf("%d", c);  
    return 0;  
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```



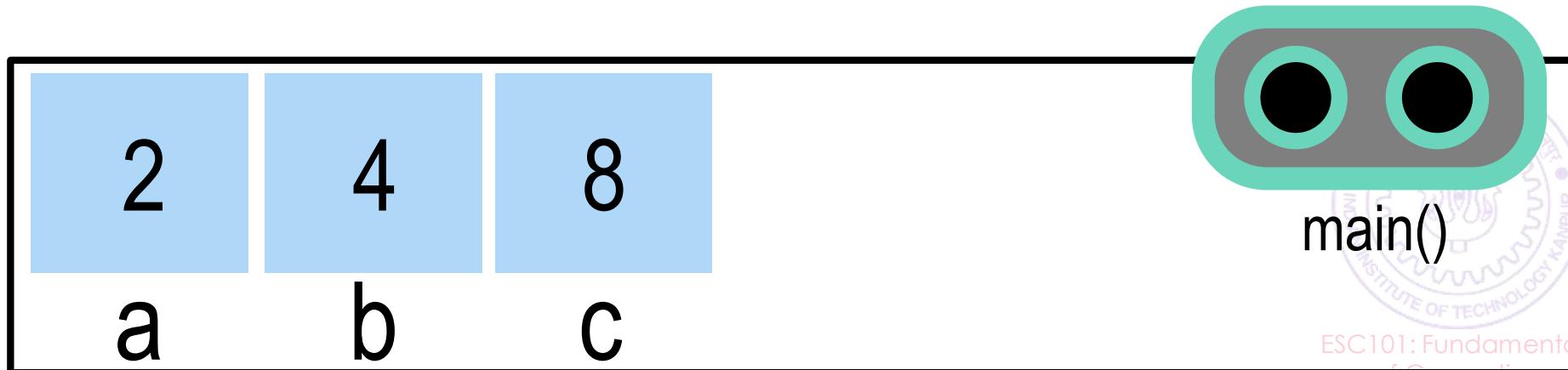
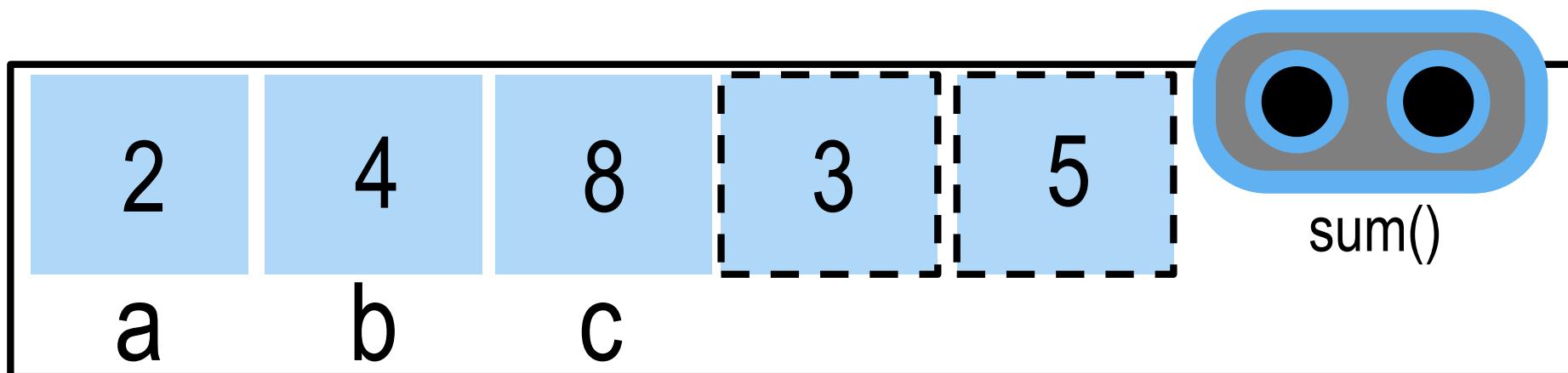
# Same function called repeatedly

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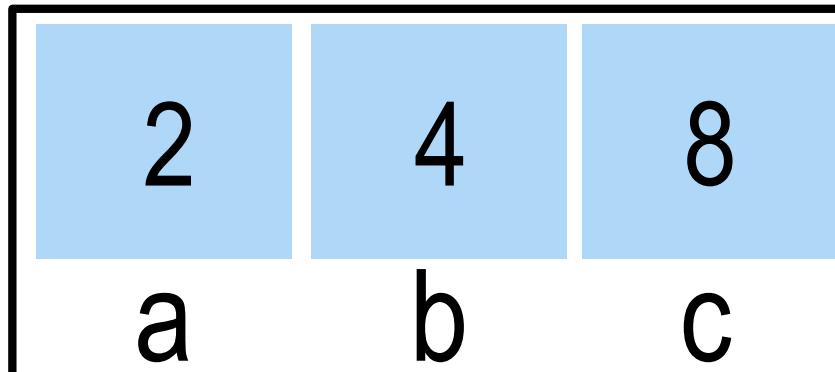
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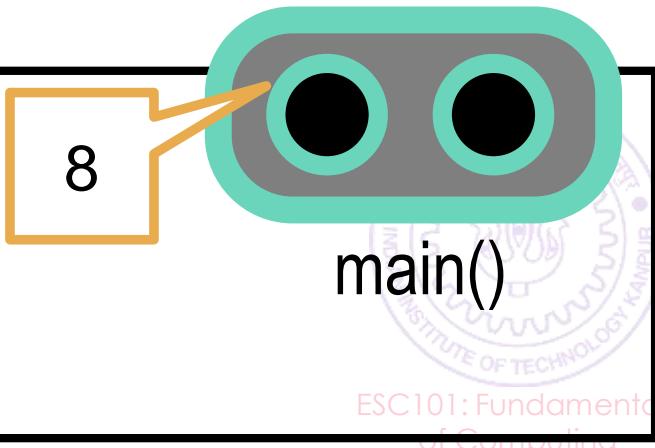
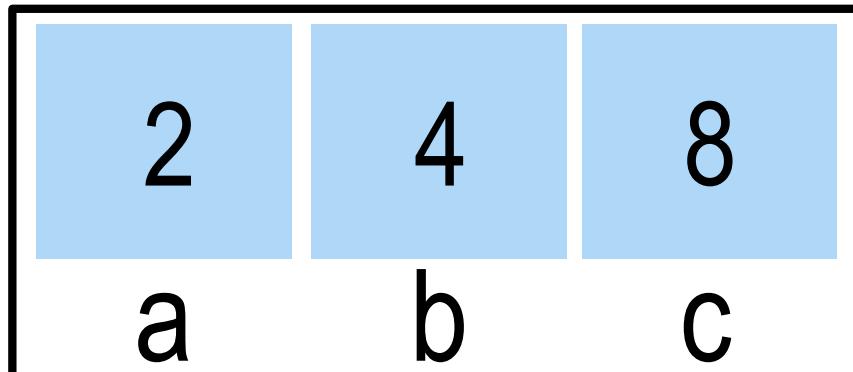
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# The 4 Golden Rules of Functions

5



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This rule may seem confusing when we are passing pointers to functions but make no mistake – rule 4 **ALWAYS** applies unless global variables involved



# More on Return

7



# More on Return

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May write return statement many times inside a function



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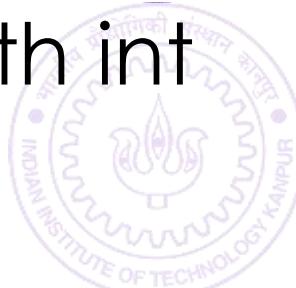
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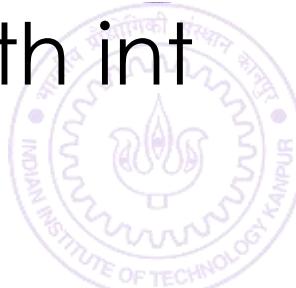
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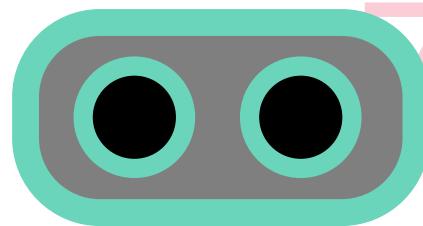
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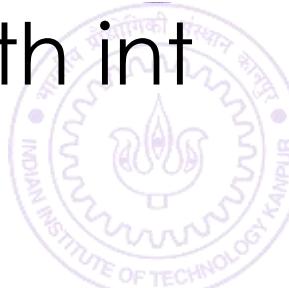
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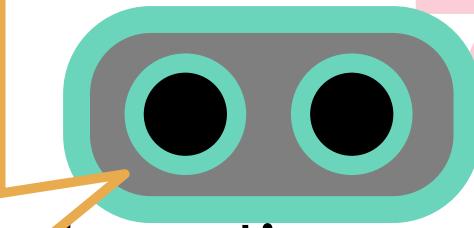
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# More on Functions

May write return

For functions that do not need to return anything i.e. void return type, you can either say return; or else not write return at all inside the function body in which case the entire body will get executed



function

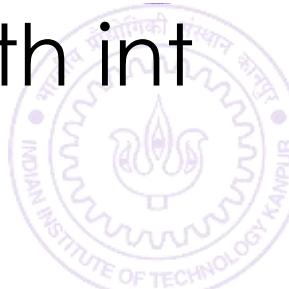
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# More on Return



# More on Return

The value that is returned can be used safely just as a normal variable of that same data type



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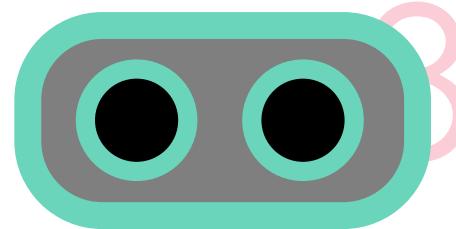
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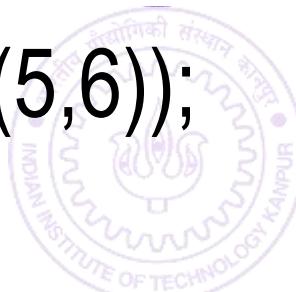
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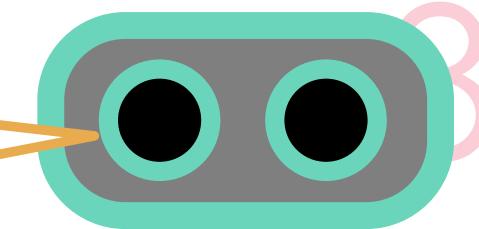
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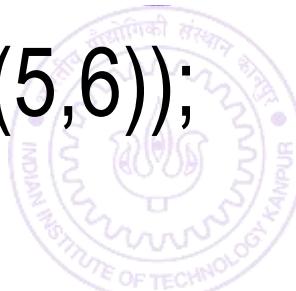
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main() is also a function  
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The value that is returned by main() is like a reserved function name. Just as a normal variable of type int cannot have type

Cannot name your function main

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# Benefits of writing functions

9



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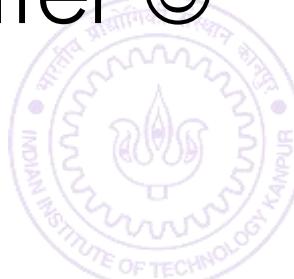
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Write the body of the if condition without worrying about primality testing etc and then define the functions later 😊



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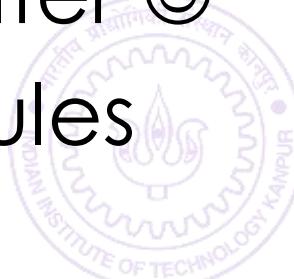
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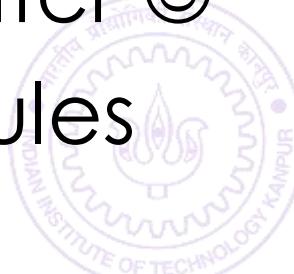
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a prime



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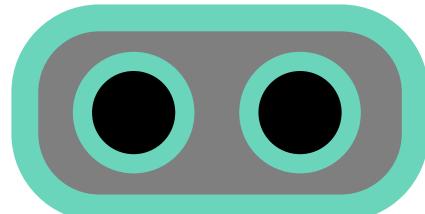
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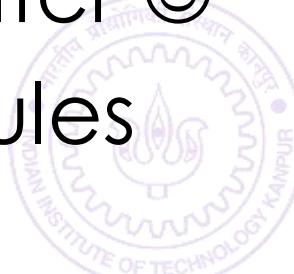
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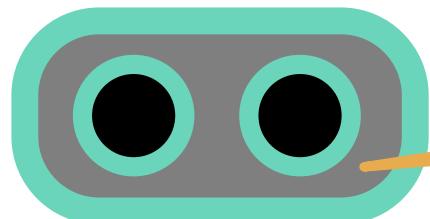
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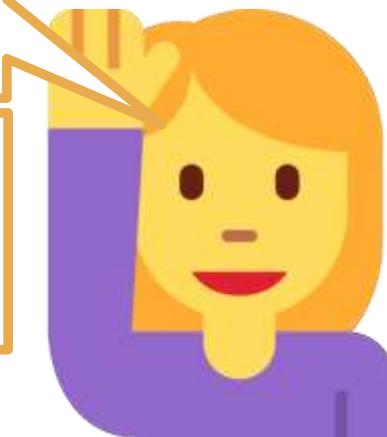
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Writing code that has modules is a type of *modular programming* – it is the industry standard!

a prime



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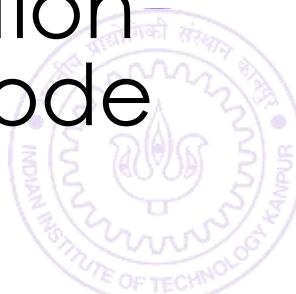
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Rest of code need not be touched, only faulty function needs to be fixed – again the industry standard of code maintenance.



# Benefits of writing functions

11



# Benefits of writing functions

**Functions allow you to reuse code**



# Benefits of writing functions

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## Functions allow you to reuse code

We are so grateful some one wrote functions like `sqrt()`, `abs()` in `math.h` that we are able to use again and again ☺



# Benefits of writing functions

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## Functions allow you to reuse code

We are so grateful some one wrote functions like `sqrt()`, `abs()` in `math.h` that we are able to use again and again ☺ `printf()` and `scanf()` are also functions. Think of how much we use them in every single program



# Benefits of writing functions

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We reused code in today's codes – didn't have to rewrite code – may make mistakes if you write same code again