More choice for Mr C

ESC101: Fundamentals of Computing

Purushottam Kar

Announcements

- Institute holiday on August 22, 2018, Wednesday
  - No lecture, no lab on August 22
  - No extra lecture this week
- Extra lab for Wednesday batches B10, B11, B12, B14
  - Saturday, August 25, 2018, 2PM New Core Labs CC-01, CC-02
- Refer to course schedule calendar on website
  web.cse.iitk.ac.in/users/purushot/courses/esc/2018-19-a/material/schedule.pdf

Announcements

- Extra session for students facing trouble with English lectures but who are comfortable with Hindi
  - Saturday, August 25, 2018, 5PM-6:30PM, New Core Labs CC-02
  - Extra session to be held just after extra lab is over for B10, B11, B12, B14
- Students familiar with other Indian languages, please refer to document on website for names of admins
  web.cse.iitk.ac.in/users/purushot/courses/esc/2018-19-a/material/language.pdf

Announcements

- Marks for week 2 lab released last weekend
- See grade-card for marks
- Go to codebook if you feel regrading is required – option will be there to make regrading request
- See guidelines in last lecture for how autograding done
- Frivolous/useless regrading requests will be penalized
- Minor quiz marks for week 2 and 3 released this week
- Sorry for the delay

The Goldilocks Challenge

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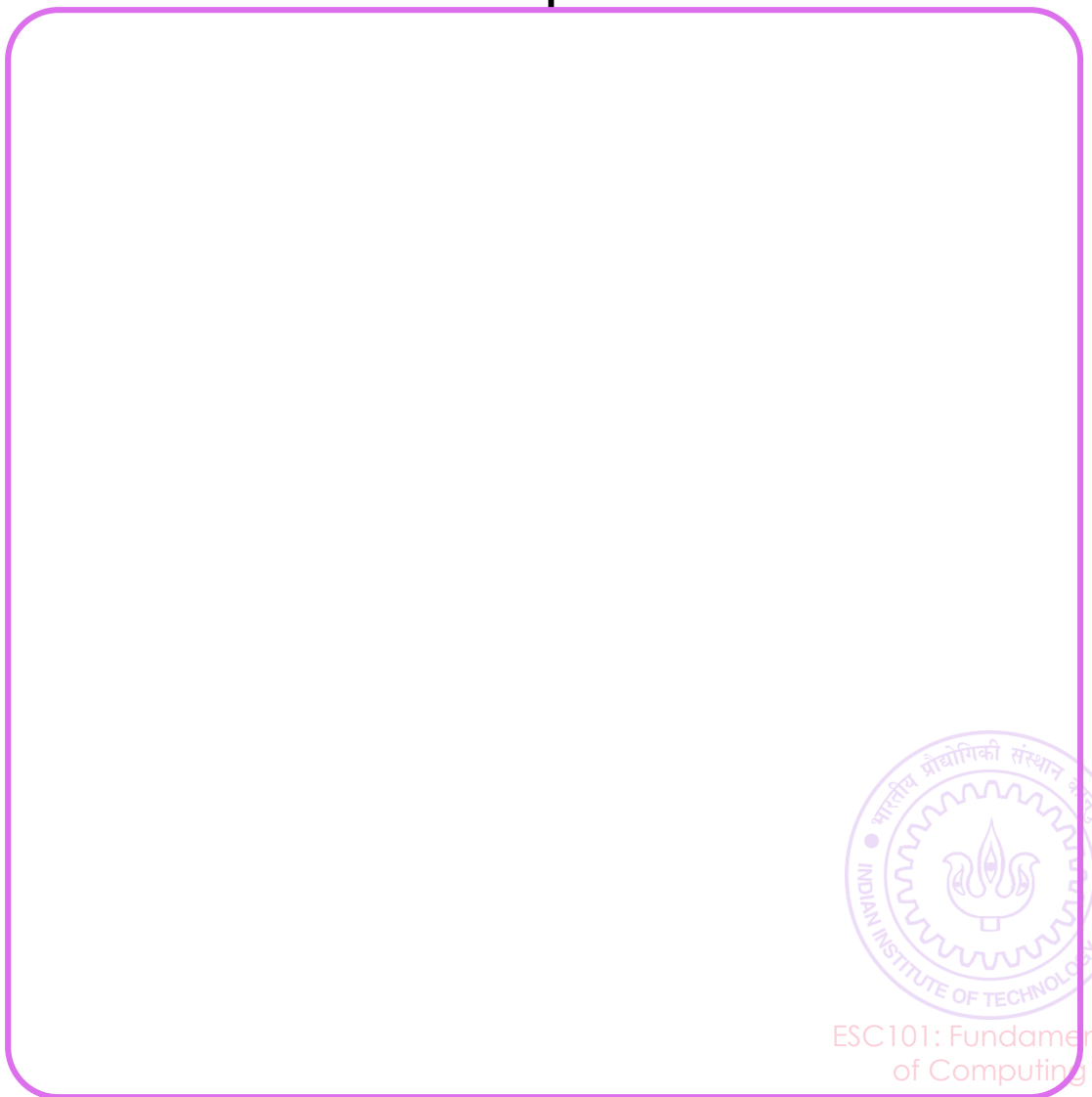

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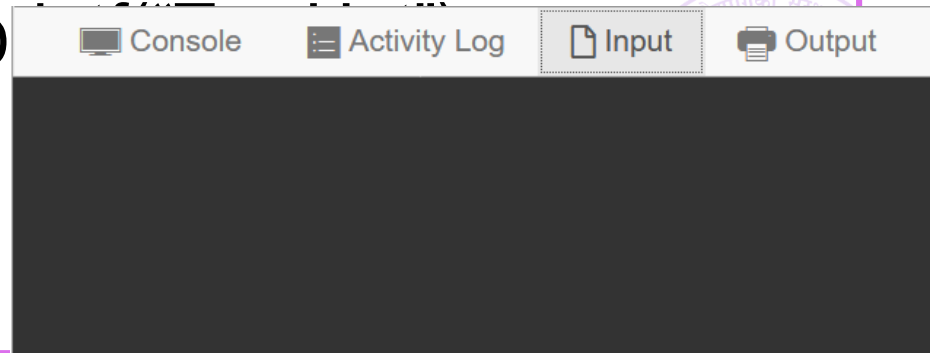

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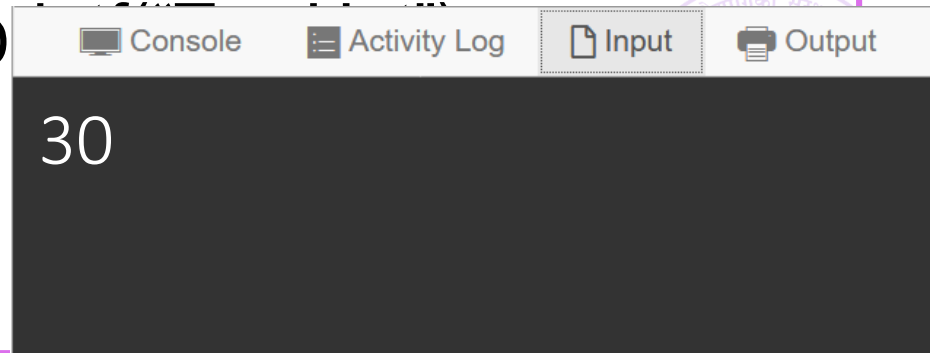

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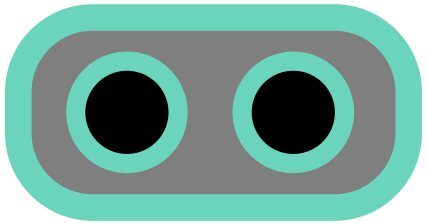

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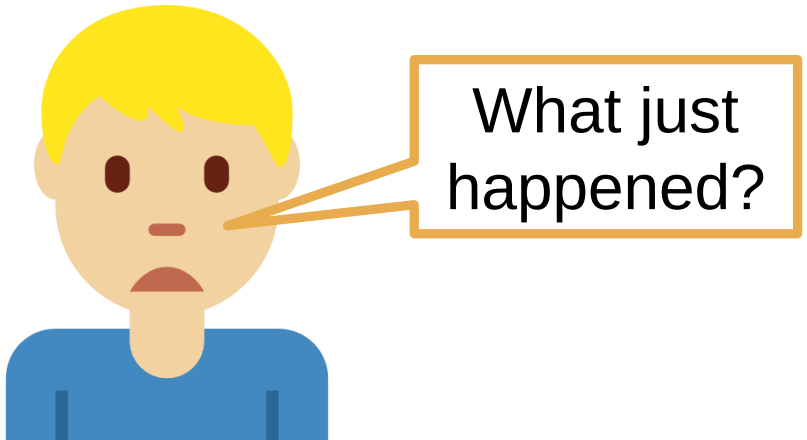


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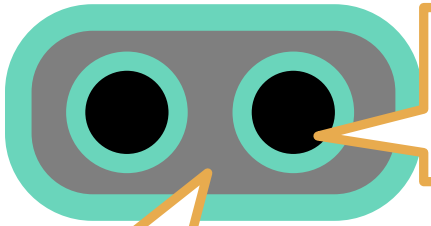
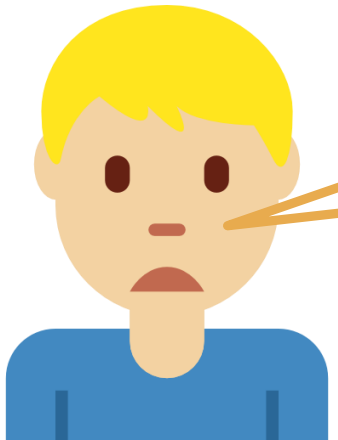


Remember, expressions generate values

Just Right



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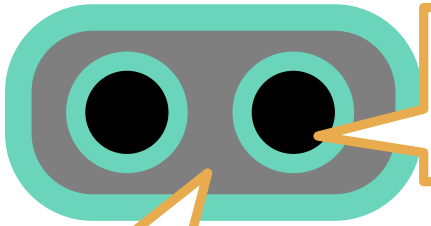

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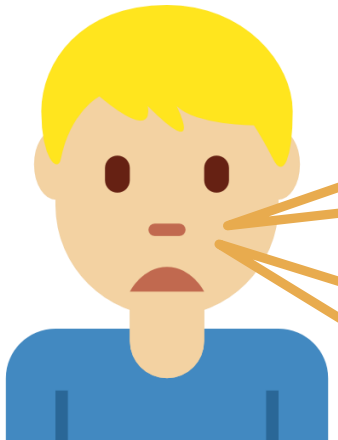

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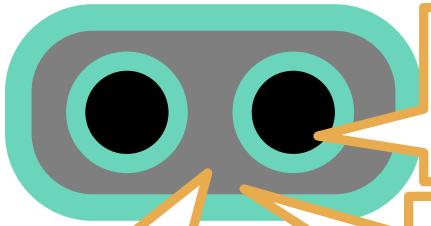

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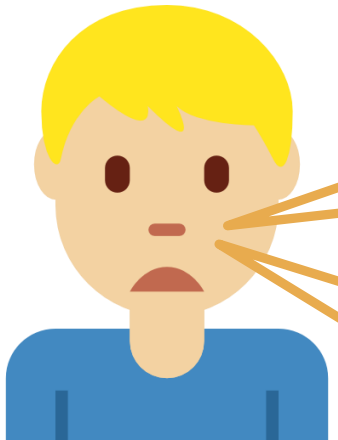

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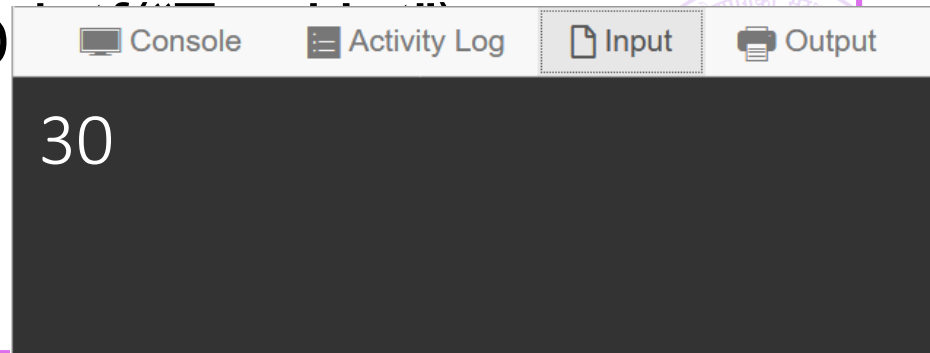

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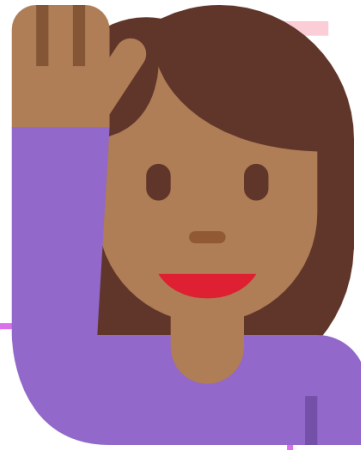

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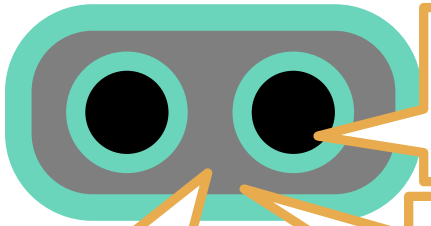

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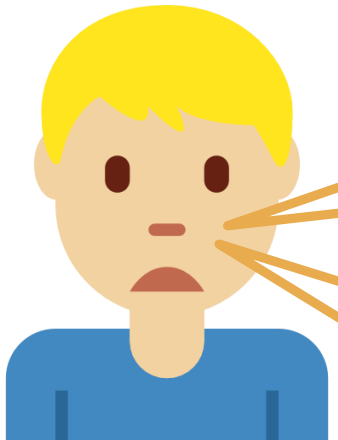

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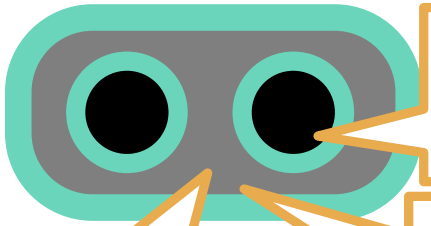

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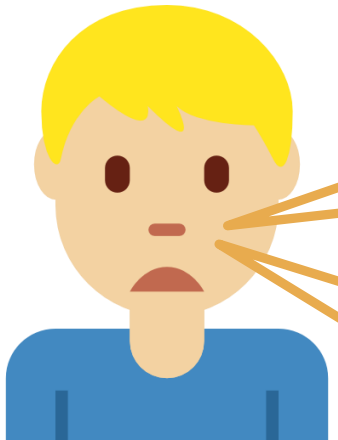

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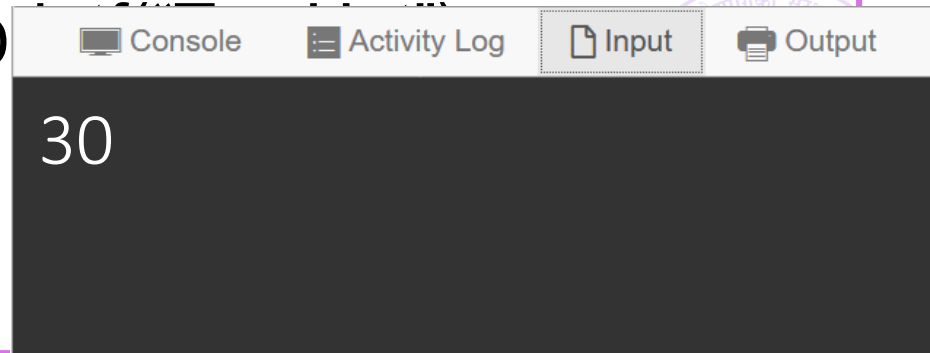

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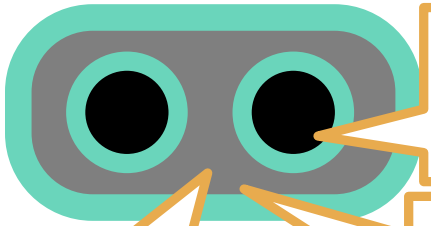

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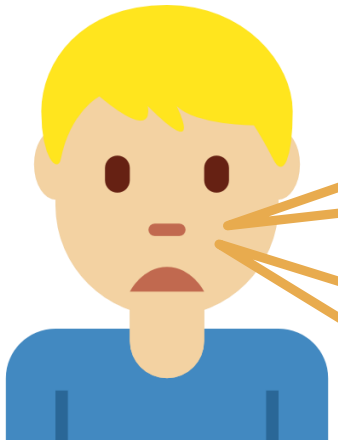

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If the expression inside if(…) evaluates to 1 or something non-zero, Mr C executes the if part. If the expression evaluates to 0, Mr C executes the else part

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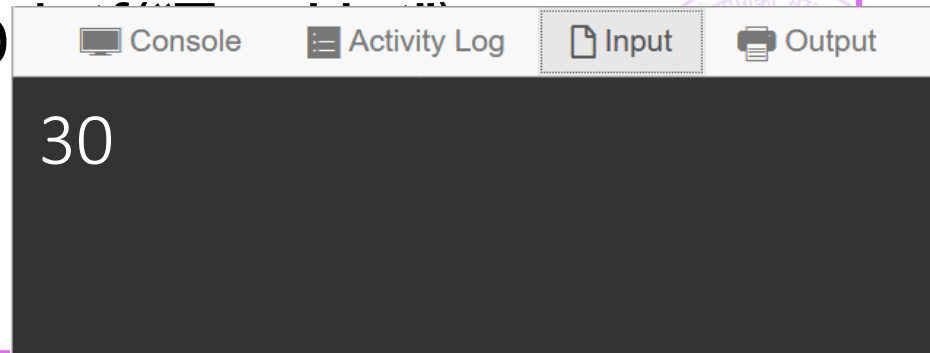

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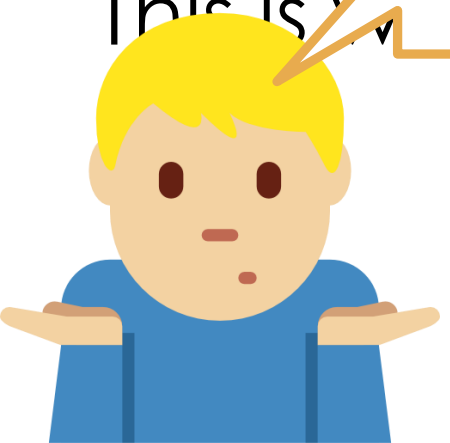
So how do I get Mr C to do something when temperature is between 22 and 27?



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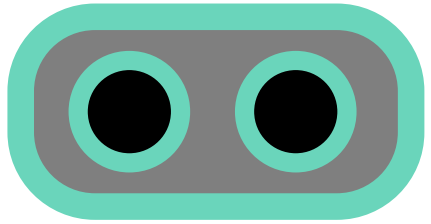

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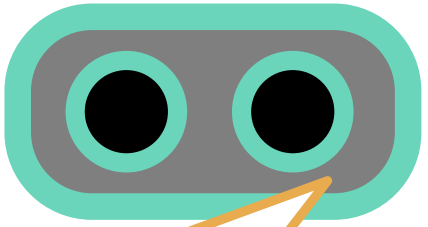

Bracket yourself to avoid errors and confusion

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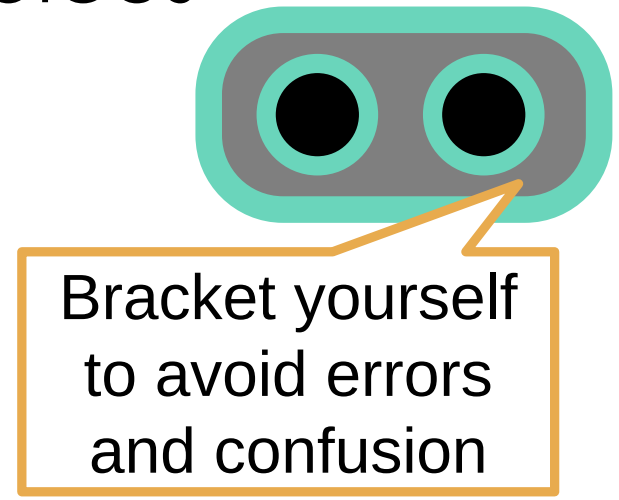

If we want temp >= 22 OR temp <= 27

```
if((temp >= 22) || (temp <= 27)){ ... }
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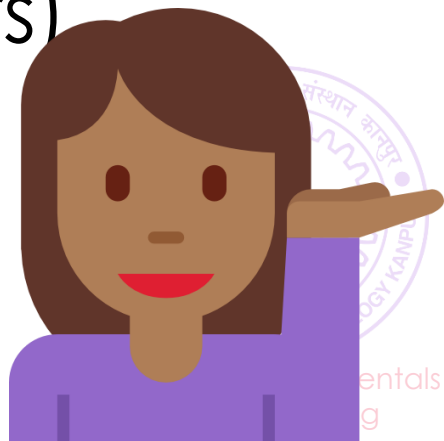
If we want NOT a % 2 == 0 (to select odd numbers)

```
if(!(a %2 == 0) ){ ... }
if(a %2 != 0){ ... }
```

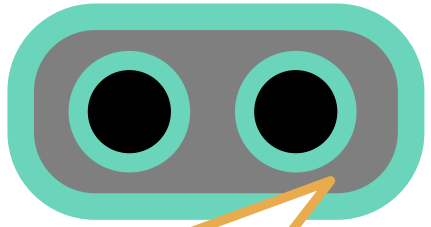


Logical Operators

Used to create powerful conditions and choices

If we want temp >= 22 AND temp <= 27

```
if((22 <= temp) && (temp <= 27)){ ... }
if((temp >= 22) && (temp <= 27)){ ... }
```



Bracket yourself to avoid errors and confusion

If we want temp >= 22 OR temp <= 27

```
if((temp >= 22) || (temp <= 27)){ ... }
```

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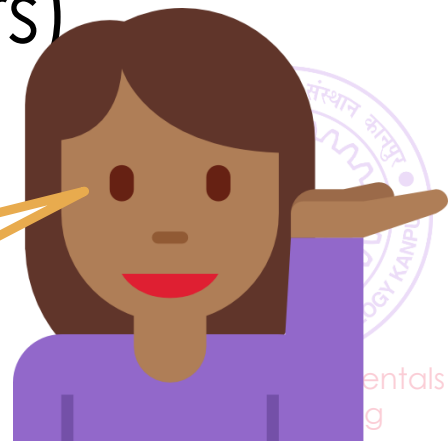

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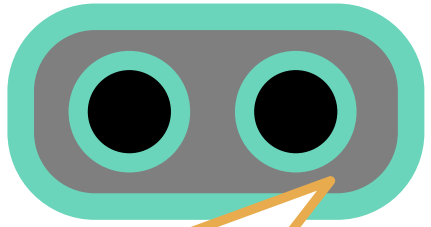

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Lets show them the new tables

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Logical Operators

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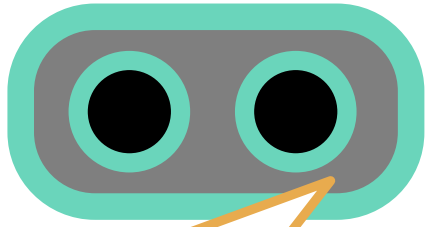

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Lets show them the new tables

Yes, but first a bit more on &&, || and !

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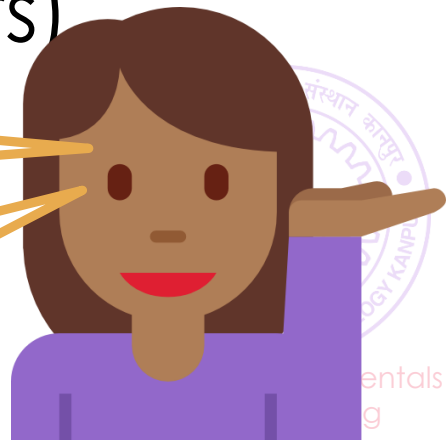

Logical Operators

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If we want temp >= 22 AND temp <= 27

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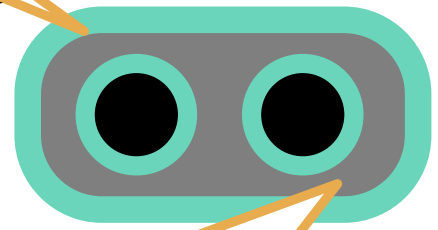
If we want temp >= 22 OR temp <= 27

```
if((temp >= 22) || (temp <= 27)){ ... }
```

If we want NOT a % 2 == 0 (to select odd numbers)

```
if(!(a %2 == 0) ){ ... }
if(a %2 != 0){ ... }
```

Good idea -



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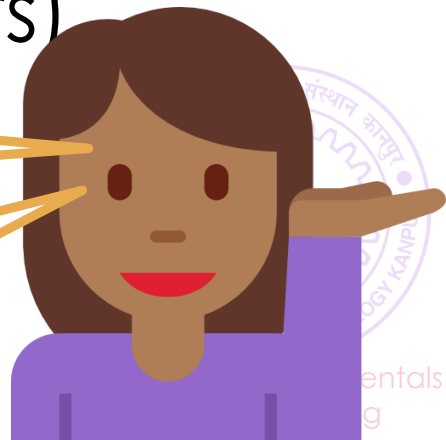

Values generated by Logical Ops

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a = 1 if good marks, else 0, b = 1 if good attendance, else 0

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Let us see various criterion to decide A grade for ESC101 ☺

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Operation	C Code	a	b
		0	0
		0	1
		1	0
		1	1

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Operation	C Code	a	b
		0	0
		0	1
		1	0
		1	1

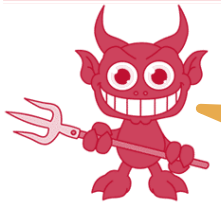
A if good attendance and good marks

Values generated by Logical Ops

a = 1 if good marks, else 0, b = 1 if good attendance, else 0

Let us see various criterion to decide A grade for ESC101 ☺

Operation	C Code	a	b
AND	c = a && b	0	0
		0	1
		1	0
		1	1



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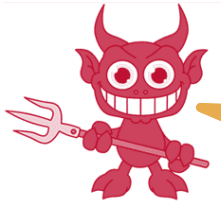
a = 1 if good marks, else 0, b = 1 if good attendance, else 0

Let us see various criterion to decide A grade for ESC101 ☺

Operation	C Code	a	b	c
AND	**c = a && b**	**0**	**0**	**0**
		0	**1**	**0**
		1	**0**	**0**
		1	**1**	**1**



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Operation	C Code	a	b	c
AND	c = a && b	0	0	0
		0	1	0
		1	0	0
		1	1	1

A if good attendance or good marks or both

Values generated by Logical Ops

a = 1 if good marks, else 0, b = 1 if good attendance, else 0

Let us see various criterion to decide A grade for ESC101 ☺

Operation	C Code	a	b	c
AND	c = a && b	0	0	0
OR	d = a || b	0	1	0
		1	0	0
		1	1	1

A if good attendance or good marks or both

Values generated by Logical Ops

a = 1 if good marks, else 0, b = 1 if good attendance, else 0

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Operation	C Code	a	b	c	d
AND	c = a && b	0	0	0	0
OR	d = a || b	0	1	0	1
		1	0	0	1
		1	1	1	1

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		1	0	0	1
		1	1	1	1

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		1	0	0	1
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OR	d = a || b	0	1	0	1
		1	0	0	1
		1	1	1	1

A if not good marks

Values generated by Logical Ops

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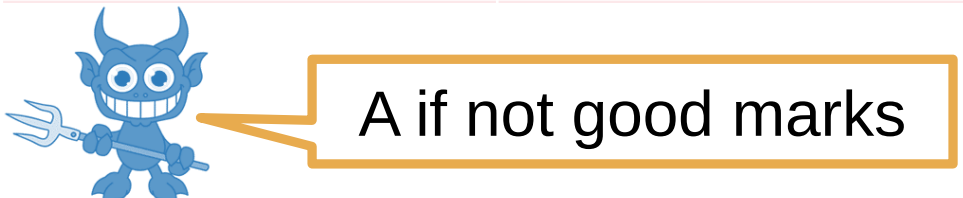
Let us see various criterion to decide A grade for ESC101 ☺

Operation	C Code	a	b	c	d
AND	c = a && b	0	0	0	0
OR	d = a || b	0	1	0	1
NOT	e = !a	1	0	0	1
		1	1	1	1



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		1	1	1	1	0

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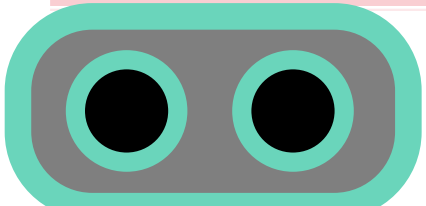
		1	1	1	1	0



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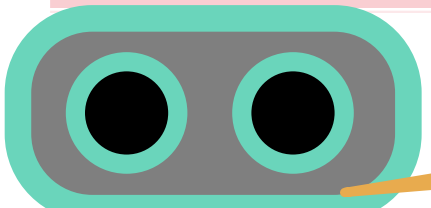
AND	c = a && b	0	0	0	0	1
OR	d = a || b	0	1	0	1	1
NOT	e = !a	1	0	0	1	0
					1	0



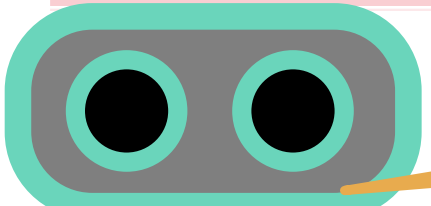
Challenge: write a relational expression which evaluates to 1 only if exactly one of a and b is 1

Values generated by Logical Ops

a = 1 if good marks, else 0, b = 1 if good attendance, else 0

Let us see various criterion to decide A grade for ESC101 ☺

Operation	C Code	a	b	c	d	e
AND	c = a && b	0	0	0	0	1
OR	d = a || b	0	1	0	1	1
NOT	e = !a	1	0	0	1	0
					1	0

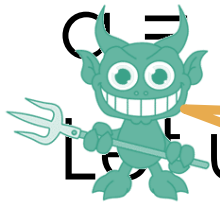


Challenge: write a relational expression which evaluates to 1 only if exactly one of a and b is 1

Values generated by Logical Ops

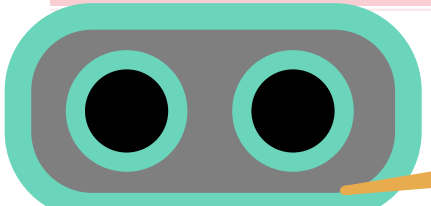
c = 1 if ... 0, b = 1 if good attendance, else 0

Let us ... on to decide A grade for ESC101 ☺



A if good attendance or good marks but not both

Operation	C Code	a	b	c	d	e
AND	c = a && b	0	0	0	0	1
OR	d = a || b	0	1	0	1	1
NOT	e = !a	1	0	0	1	0
					1	0



Challenge: write a relational expression which evaluates to 1 only if exactly one of a and b is 1

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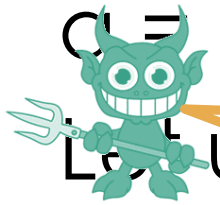
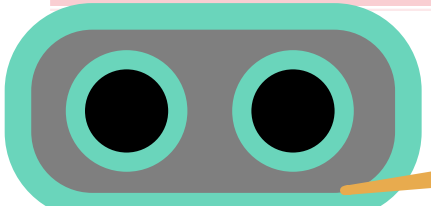
a = 1 if [illegible] 0, b = 1 if good attendance, else 0

Let us [illegible]on to decide A grade for ESC101 ☺



A if good attendance or good marks but not both

Operation	C Code	a	b	c	d	e
AND	c = a && b	0	0	0	0	1
OR	d = a || b	0	1	0	1	1
NOT	e = !a	1	0	0	1	[illegible]
					1	[illegible]



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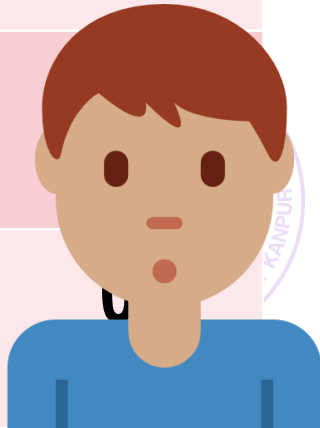

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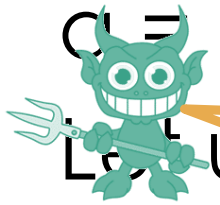


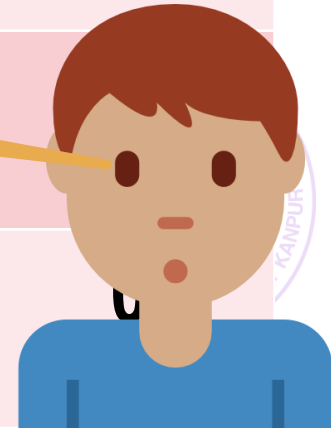
A if good attendance or good marks but not both

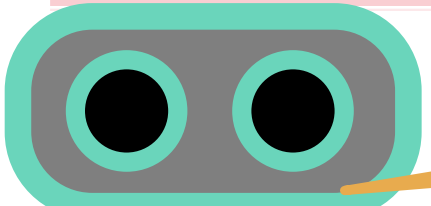
a = 1 if [illegible] 0, b = 1 if good attendance, else 0

Let us [illegible]on to decide A grade for ESC101 ☺

Operation	C Code	a	b	c	d	e
AND	c = a && b	0	0	0	0	1
OR	d = a || b	0	1	0	1	1
NOT	e = !a	1	[illegible]	[illegible]	[illegible]	[illegible]
					1	[illegible]

So if a = 1 and b = 0 then the answer should be 1



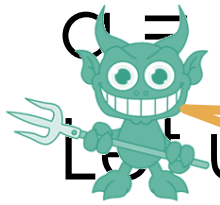


Challenge: write a relational expression which evaluates to 1 only if exactly one of a and b is 1

Values generated by Logical Ops

c = 1 if [illegible] 0, b = 1 if good attendance, else 0

Let us [illegible]on to decide A grade for ESC101 ☺

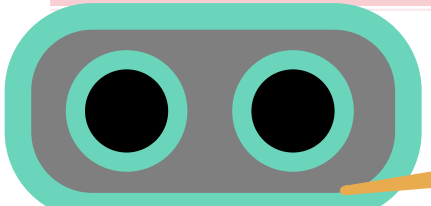


A if good attendance or good marks but not both

Operation	C Code	a	b	c	d	e
AND	c = a && b	0	0	0	0	1
OR	d = a || b	0				1
NOT	e = !a	1				
					1	

But if a = 1, b = 1, then answer should be 0

So if a = 1 and b = 0 then the answer should be 1



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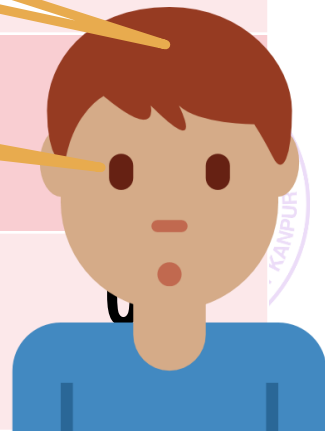

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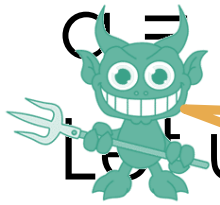
Let us [illegible]on to decide A grade for ESC101 ☺



A if good attendance or good marks but not both

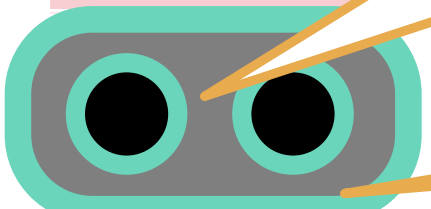
Operation	C Code	a	b	c	d	e
AND	c = a && b	0	0	0	0	1
OR	d = a || b	0				1
NO[illegible]		[illegible]1				
					1	

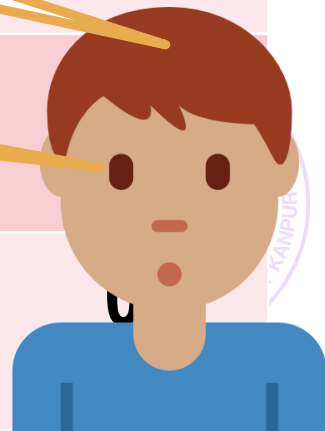
But if a = 1, b = 1, then answer should be 0

So if a = 1 and b = 0 then the answer should be 1

Correct! This is called the XOR (exclusive or) operation

Challenge: write a relational expression which evaluates to 1 only if exactly one of a and b is 1

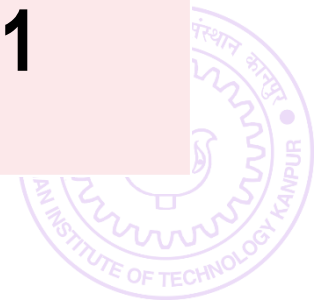




Some Examples

Some Examples

C Code	a	b	c	d	e
c = (a && b) || a	0	0	0	1	0
d = !(a && b)	0	1	0	1	0
e = (a || b) && !d	1	0	1	1	0
	1	1	1	0	1



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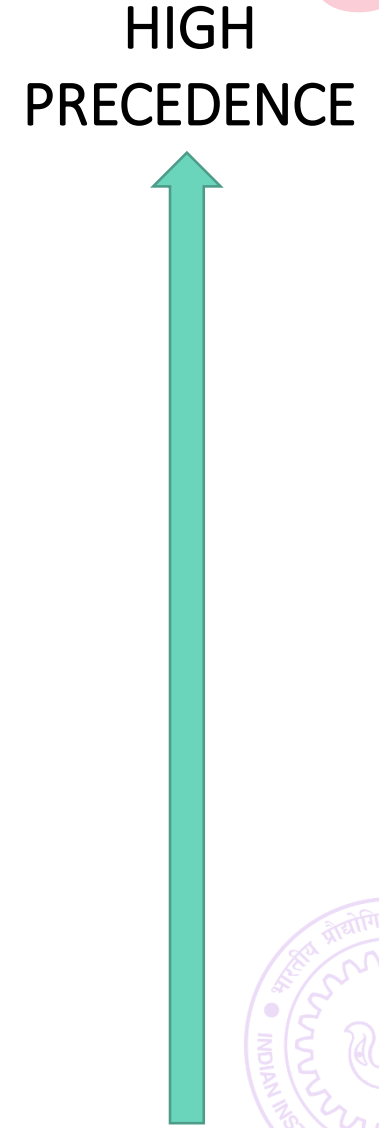

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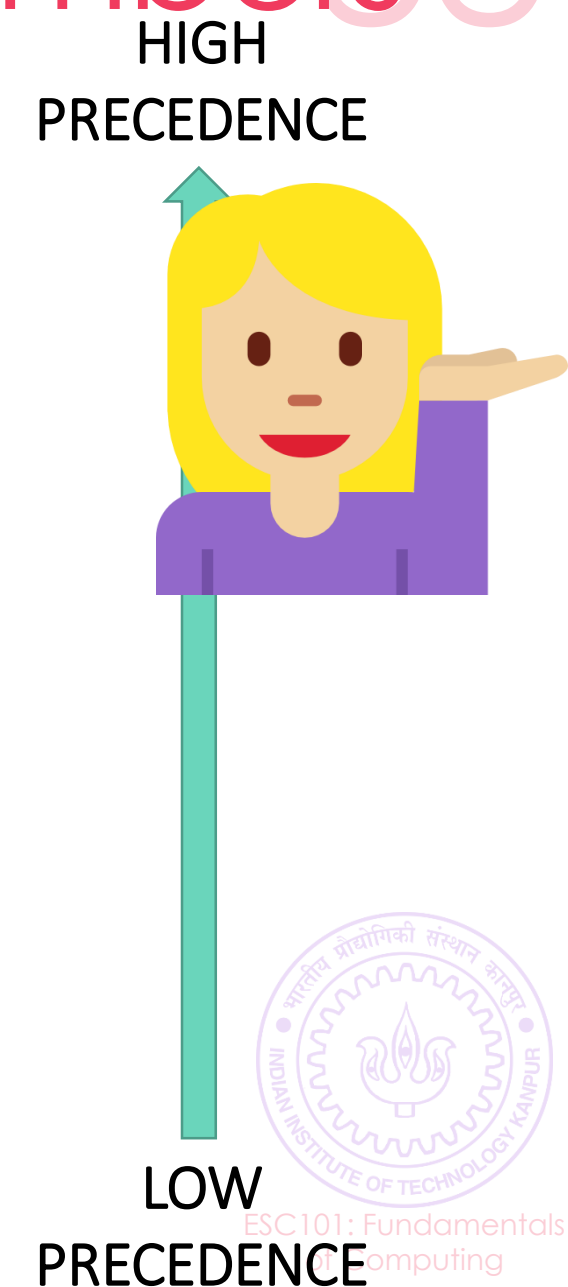

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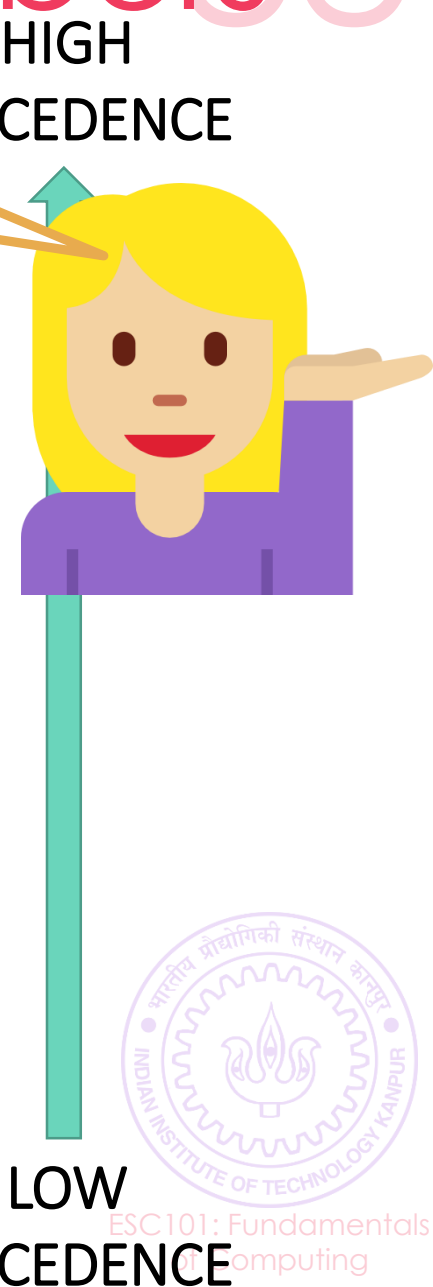
Write this table down in your notebook. Allowed in labs, quizzes, exams. No need to memorize.



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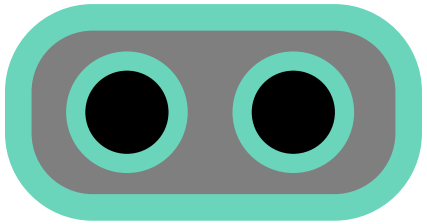

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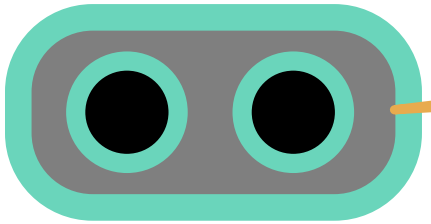

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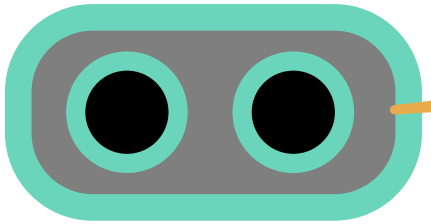

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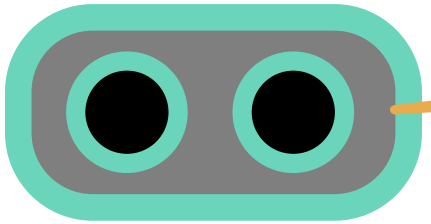

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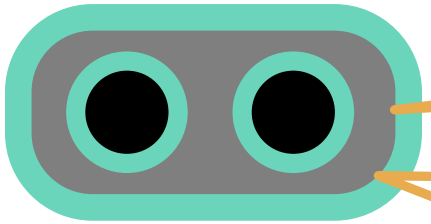

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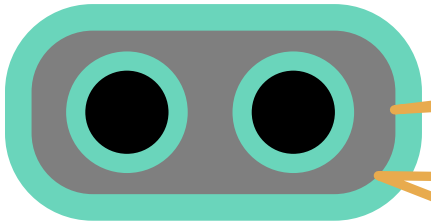

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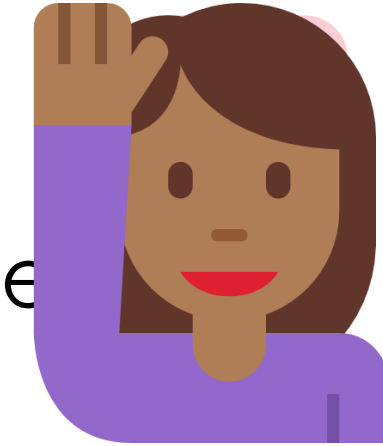

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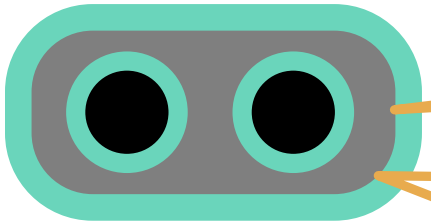

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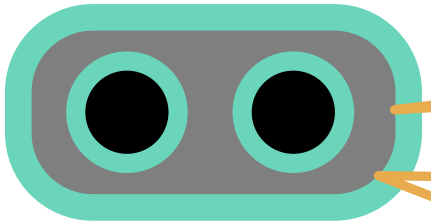

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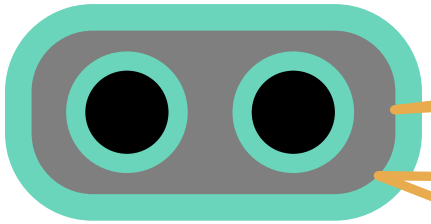

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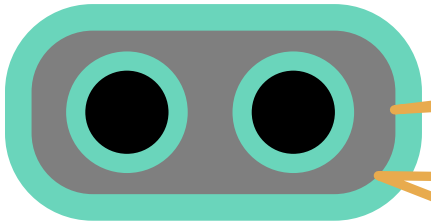

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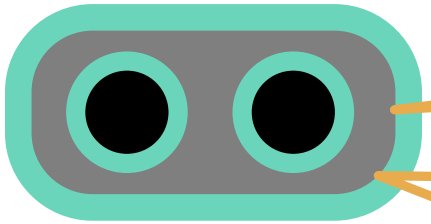

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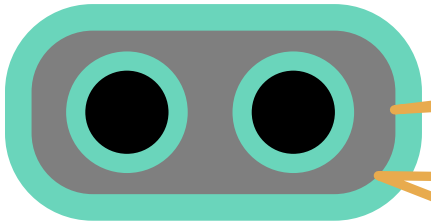

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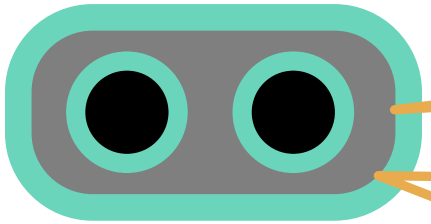

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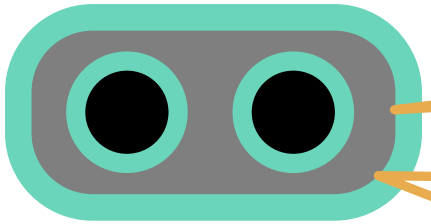

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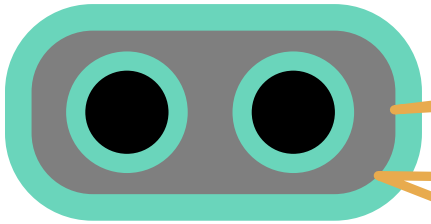

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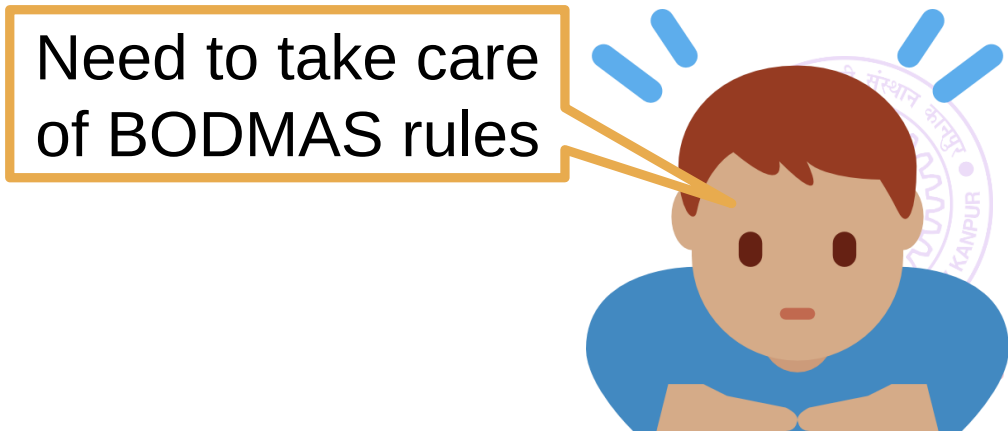

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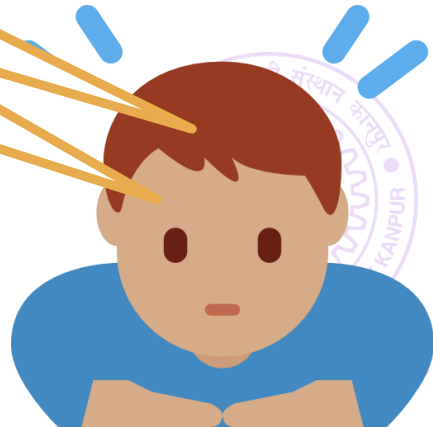
Use these expressions in a printf statement to check your answers

Need to take care of BODMAS rules



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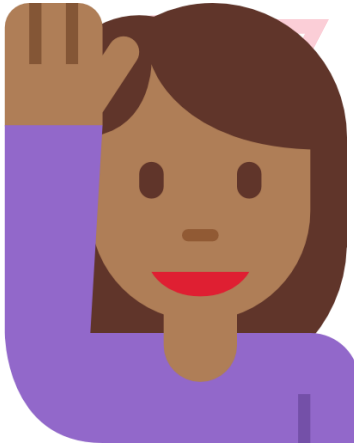

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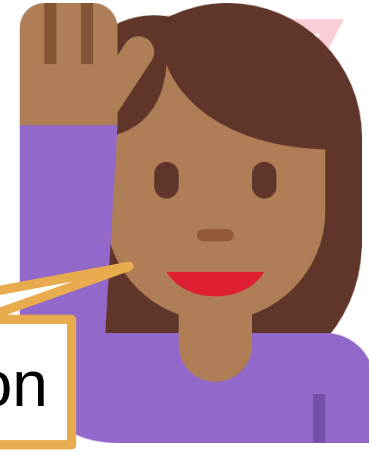


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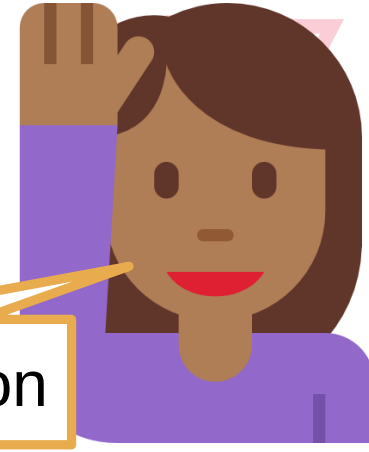


```
if(a == 1)
    printf("One");
else if(a == 2)
    printf("Two");
else if(a == 3)
    printf("Three");
else if(a == 4)
    printf("Four");
```

SAME OUTPUT

Risky business with brackets

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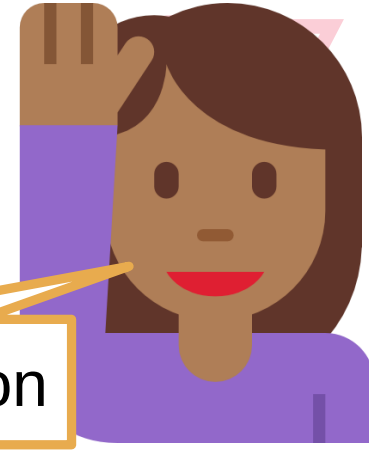


```
if(a == 1)
    printf("One");
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```

SAME OUTPUT

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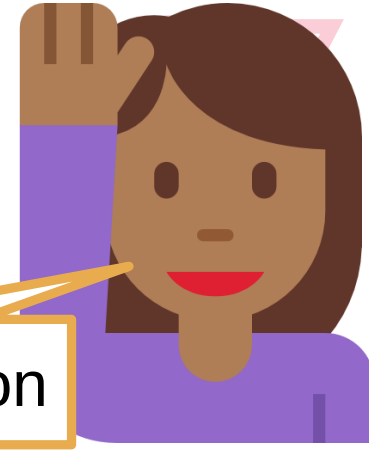


```
if(a == 1)
    printf("One");
else if(a == 2)
    printf("Two");
else if(a == 3)
    printf("Three");
else if(a == 4)
    printf("Four");
```

SAME OUTPUT

```
if(a == 1){


}else{









}
```

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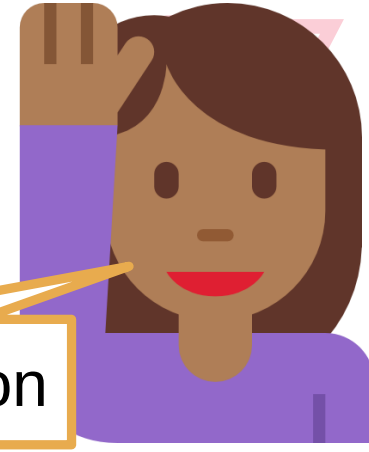


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if(a == 1)
    printf("One");
else if(a == 2)
    printf("Two");
else if(a == 3)
    printf("Three");
else if(a == 4)
    printf("Four");
```

SAME OUTPUT

```
if(a == 1){
    printf("One");
}else{
                                                    }
```

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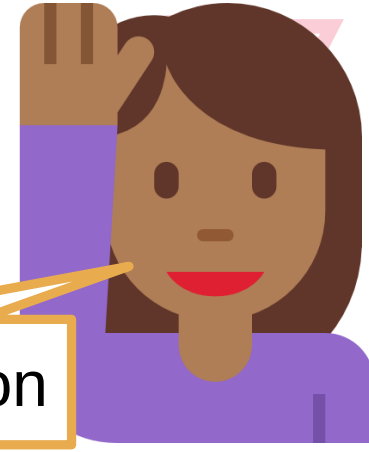


```
if(a == 1)
    printf("One");
else if(a == 2)
    printf("Two");
else if(a == 3)
    printf("Three");
else if(a == 4)
    printf("Four");
```

SAME OUTPUT

```
if(a == 1){
    printf("One");
}else{ if(a == 2){

        }else{

                                    }}
```

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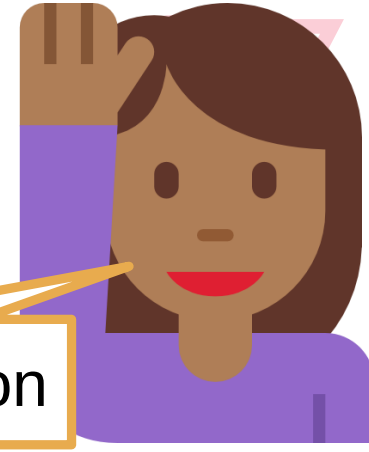


```
if(a == 1)
    printf("One");
else if(a == 2)
    printf("Two");
else if(a == 3)
    printf("Three");
else if(a == 4)
    printf("Four");
```

SAME OUTPUT

```
if(a == 1){
    printf("One");
}else{ if(a == 2){
        printf("Two");
    }else{

                                    }}
```

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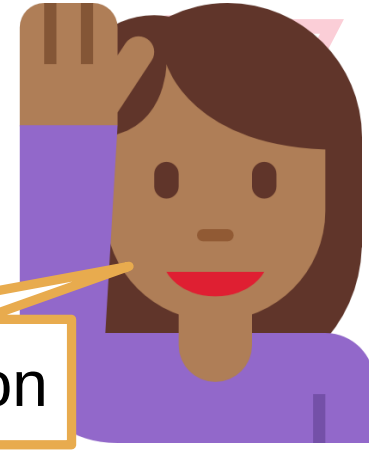


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else if(a == 2)
    printf("Two");
else if(a == 3)
    printf("Three");
else if(a == 4)
    printf("Four");
```

SAME OUTPUT

```
if(a == 1){
    printf("One");
}else{ if(a == 2){
        printf("Two");
    }else{ if(a == 3){

            }else{

                                }}}
```

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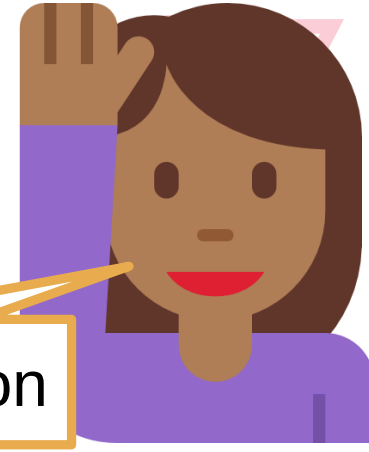


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    printf("Three");
else if(a == 4)
    printf("Four");
```

SAME OUTPUT

```
if(a == 1){
    printf("One");
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        printf("Two");
    }else{ if(a == 3){
            printf("Three");
        }else{
                                }}}
```

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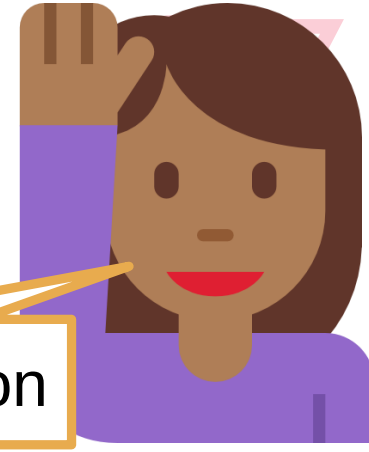


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if(a == 1)
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    printf("Two");
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    printf("Three");
else if(a == 4)
    printf("Four");
```

SAME OUTPUT

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if(a == 1){
    printf("One");
}else{ if(a == 2){
        printf("Two");
    }else{ if(a == 3){
            printf("Three");
        }else{ if(a == 4){
                }}}}
```

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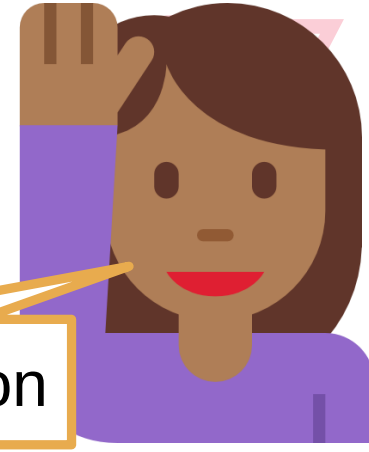


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SAME OUTPUT

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if(a == 1){
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    }else{ if(a == 3){
            printf("Three");
        }else{ if(a == 4){
                printf("Four");}}}}
```

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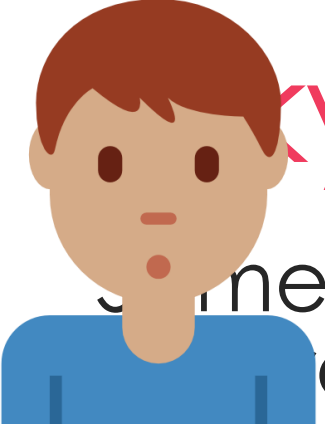

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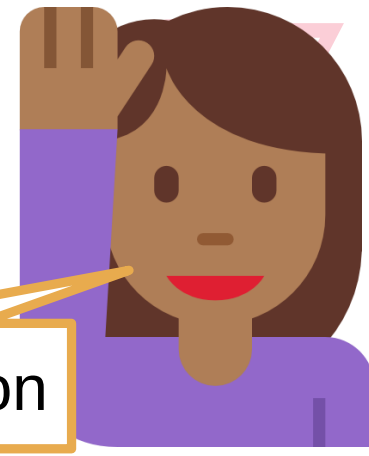
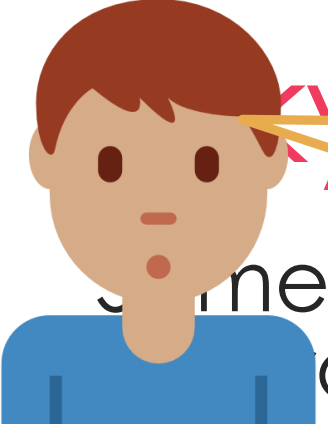



```
if(a == 1)
    printf(“One”);
else if(a == 2)
    printf(“Two”);
else if(a == 3)
    printf(“Three”);
else if(a == 4)
    printf(“Four”);
```

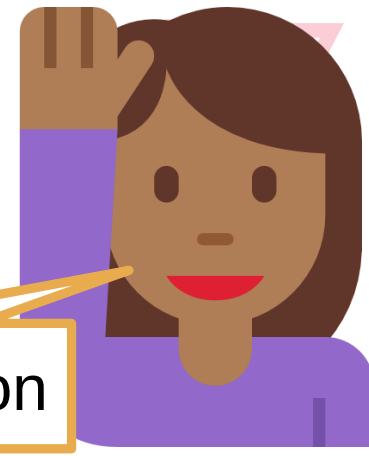
SAME OUTPUT

```
if(a == 1){
    printf(“One”);
}else{ if(a == 2){
        printf(“Two”);
    }else{ if(a == 3){
            printf(“Three”);
        }else{ if(a == 4){
                printf(“Four”);}}}}
```

...rackets



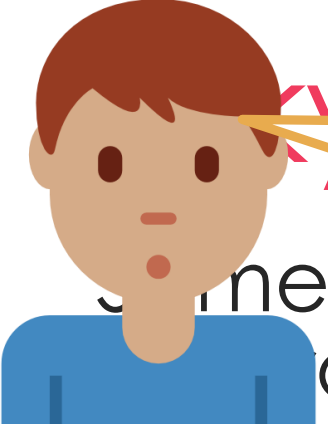
...metimes, to make code look pretty, professional ...ammers omit brackets when not r...




```
if(a == 1)
    printf("One");
else if(a == 2)
    printf("Two");
else if(a == 3)
    printf("Three");
else if(a == 4)
    printf("Four");
```

SAME OUTPUT

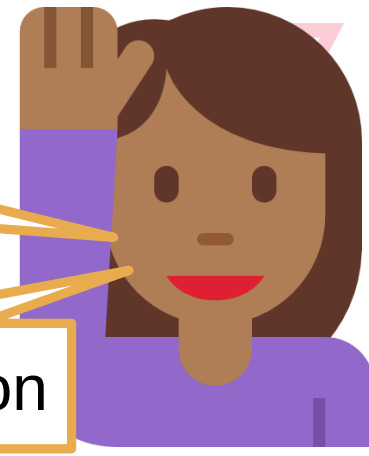
```
if(a == 1){
    printf("One");
}else{ if(a == 2){
        printf("Two");
    }else{ if(a == 3){
            printf("Three");
        }else{ if(a == 4){
                printf("Four");}}}}
```



Hmm … so an if-else combination counts as a statement?

...rackets

...metimes, to make code look pretty, professional ...grammers omit brackets when not r...



Yup!

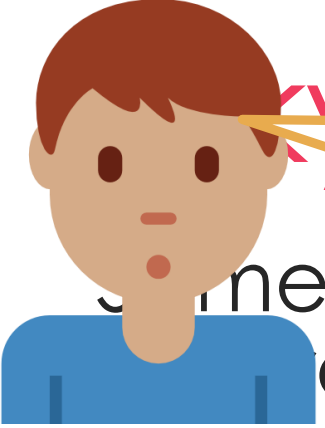
Better indentation

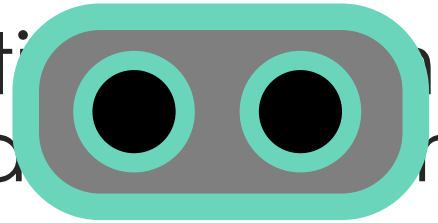
```
if(a == 1)
    printf("One");
else if(a == 2)
    printf("Two");
else if(a == 3)
    printf("Three");
else if(a == 4)
    printf("Four");
```

SAME OUTPUT

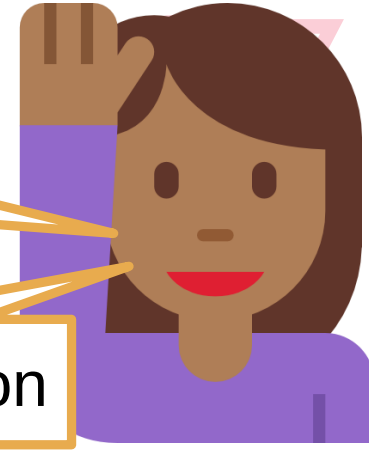
```
if(a == 1){
    printf("One");
}else{ if(a == 2){
        printf("Two");
    }else{ if(a == 3){
            printf("Three");
        }else{ if(a == 4){
                printf("Four");}}}}
```

rackets





ake code look pretty, professional
nit brackets when not r




```
if(a == 1)
    printf("One");
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    printf("Two");
else if(a == 3)
    printf("Three");
else if(a == 4)
    printf("Four");
```

SAME OUTPUT

```
if(a == 1){
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}else{ if(a == 2){
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            printf("Three");
        }else{ if(a == 4){
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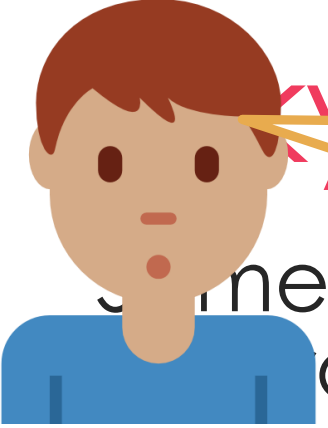
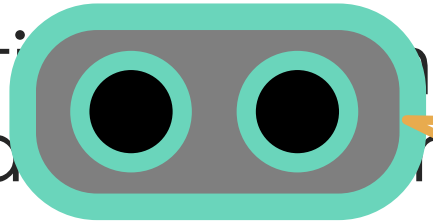
```

rackets



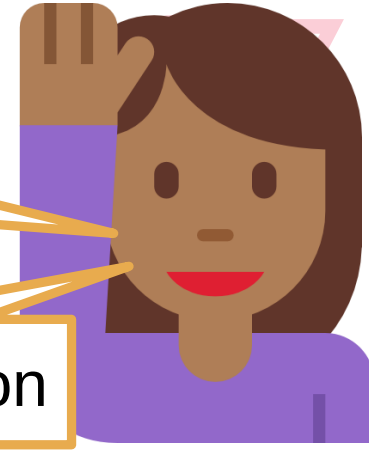
Hmm … so an if-else combination counts as a statement?



Remember, we discussed *nested* if-else statements

Yup!

Better indentation



```
if(a == 1)
    printf("One");
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    printf("Two");
else if(a == 3)
    printf("Three");
else if(a == 4)
    printf("Four");
```

SAME OUTPUT

```
if(a == 1){
    printf("One");
}else{ if(a == 2){
        printf("Two");
    }else{ if(a == 3){
            printf("Three");
        }else{ if(a == 4){
                printf("Four");}}}}
```

Unsafe Practices

Here as well, if you do not put curly brackets, Mr. C will try to put them for you

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```
if((a != 0) && (b != 0))
```

Unsafe Practices

Here as well, if you do not put curly brackets, Mr. C will try to put them for you

```
if((a != 0) && (b != 0))
    if(a * b >= 0)
```

Unsafe Practices

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```
if((a != 0) && (b != 0))
    if(a * b >= 0)
        printf("Positive product");
```

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if((a != 0) && (b != 0))
    if(a * b >= 0)
        printf("Positive product");
else
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if((a != 0) && (b != 0))
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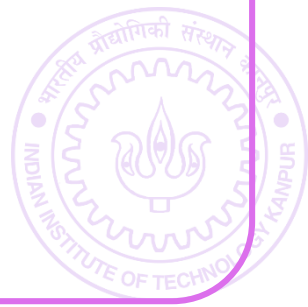

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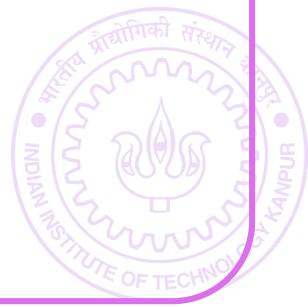
```
if((a != 0) && (b != 0))
    if(a * b >= 0)
        printf("Positive product");
else
    printf("One number is zero");
```

```
if((a != 0) && (b != 0)){
```



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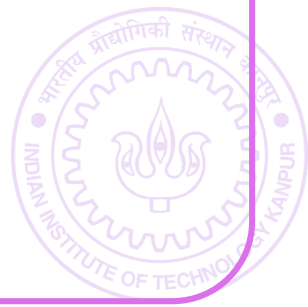
```



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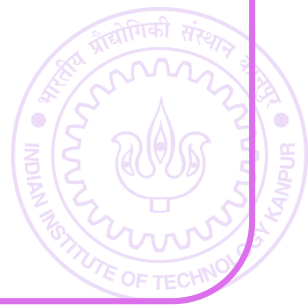

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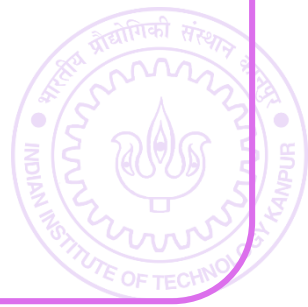
        printf("Positive product");
    }else{
```



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    }else{
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    }
}
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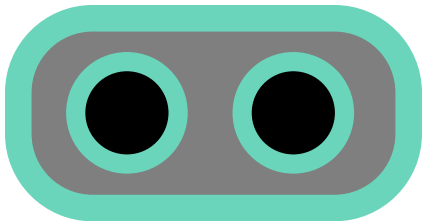

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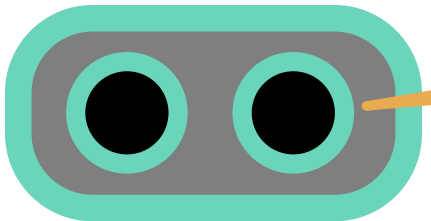
        printf("Positive product");
    }else{
        printf("One number is zero");
    }
}
```



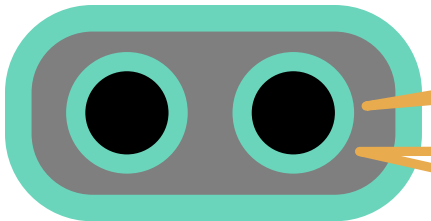
If you do not put brackets, I will match else to closest if

Unsafe Practices

Here as well, if you do not put curly brackets, Mr. C will try to put them for you

```
if((a != 0) && (b != 0))
    if(a * b >= 0)
        printf("Positive product");
else
    printf("One number is zero");
```

```
if((a != 0) && (b != 0)){
    if(a * b >= 0){
        printf("Positive product");
    }else{
        printf("One number is zero");
    }
}
```



If you do not put brackets, I will match else to closest if

I will not care how you did indentation

Unsafe Practices

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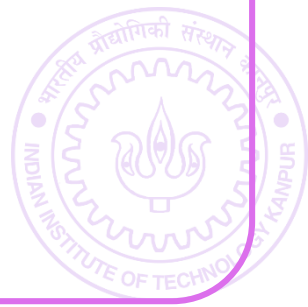
```
if(a == 5)
```



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if(a == 5)
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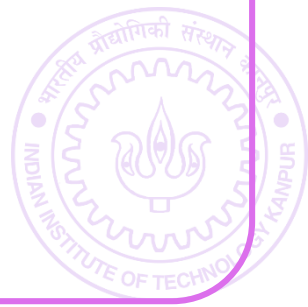

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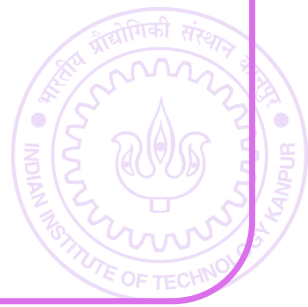

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if(a == 5)
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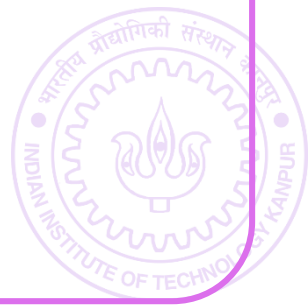

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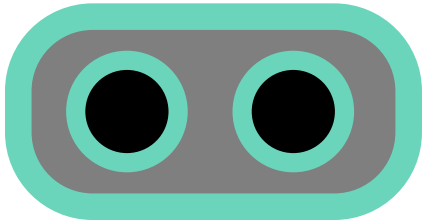

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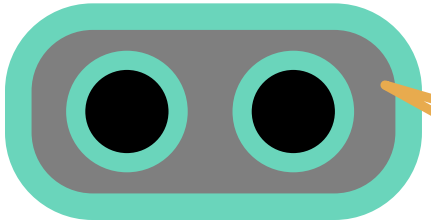

Does not make sense to me

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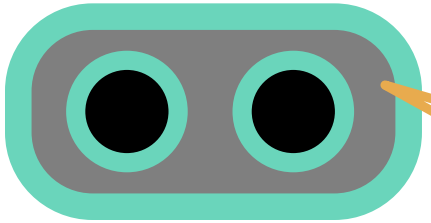

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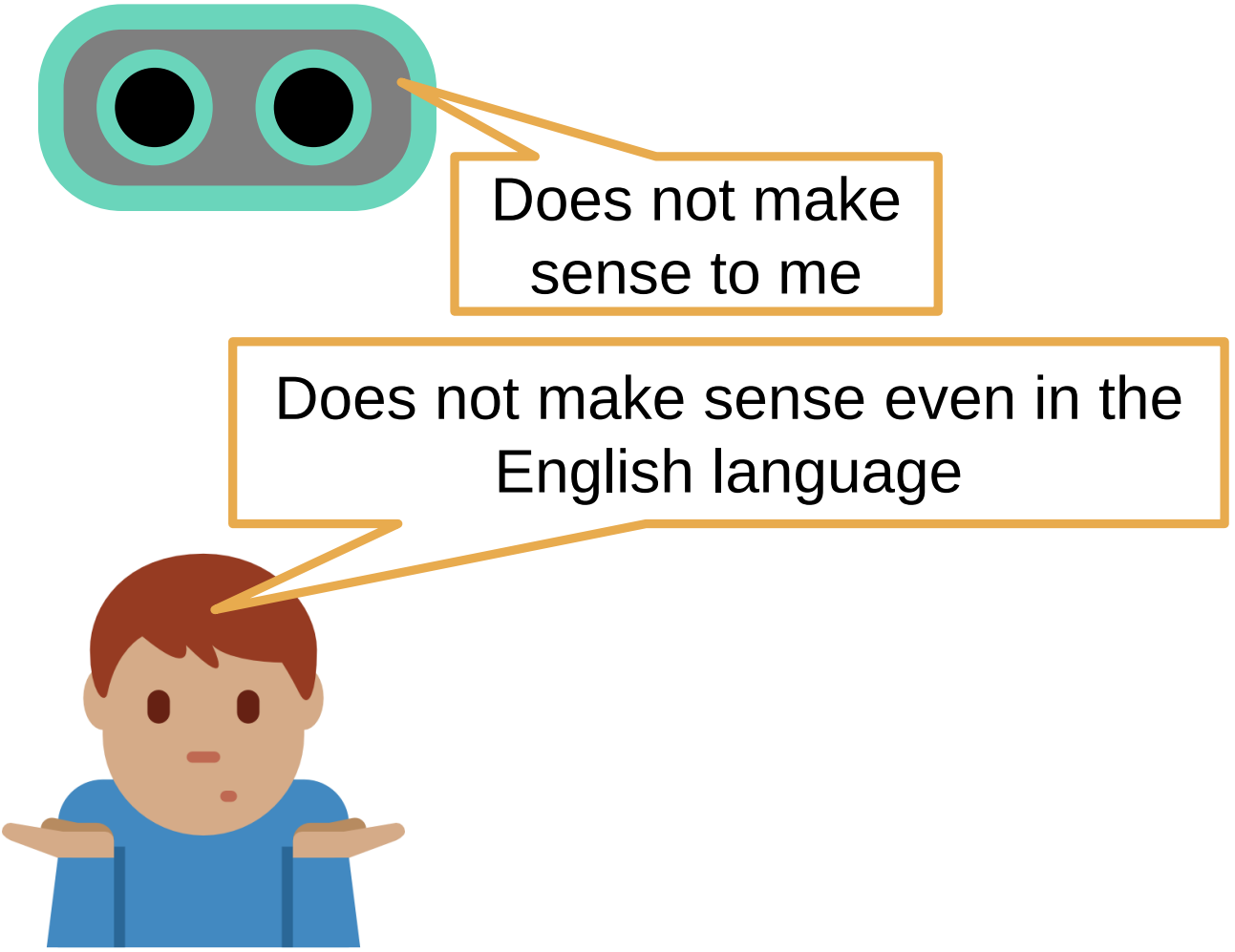


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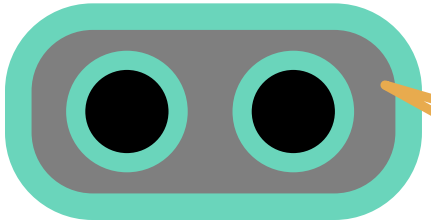
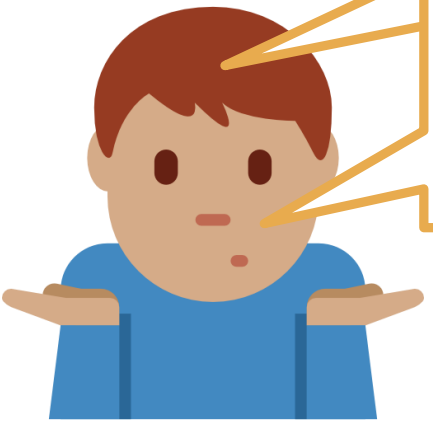


Does not make sense to me

Does not make sense even in the English language



If you are hungry go to the mess, else go to the lab, else go to the ShopC

```
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