FINE 434: FinTech

Lecture 3

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Logical Operators

A	B	not A	A and B	A or B
True	True	False	True	True
True	False	False	False	True
False	True	True	False	True
False	False	True	False	False

Logical Operators

A	B	not A	A and B	A or B
True	True	False	True	True
True	False	False	False	True
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But... what if you forget??

Ask And Ye Shall Receive

```
1  A = True
2  B = False
3
4  not A
```

```
False
```

```
1  A or B
```

```
True
```

```
1  A and B
```

```
False
```

Dealing with Parenthesis

A = False
B = False

(not A) or B = ?

((not A) and B) or (A and (not B)) = ?

Dealing with Parenthesis

A = False
B = False

(not A) or B = ?

((not A) and B) or (A and (not B)) = ?

Aside: First case is $\Longrightarrow$; Second case is xor

When in doubt...

```
1  A = False
2  B = False
3
4  (not A) or B
```

```
True
```

```
1  ((not A) and B) or (A and (not B))
```

```
False
```

Math meets Logic

- x $==$ y is True iff x = y
- x ! $=$ y is False iff x = y
- x $>$ y is True iff x $>$ y
- x $>=$ y is True iff x $\geqslant$ y
- x $<$ y is True iff x $<$ y
- x $<=$ y is True iff x $\leqslant$ y

When in doubt...

```
1  x = 1
2  y = 2
3
4  x == y
```

```
False
```

```
1  x > y
```

```
False
```

```
1  x < y
```

```
True
```

Your Turn

x = 1
y = 2
A = (x = y)
A or (x $>$ y)

What does this code return?

Your Turn

x = 1
y = 2
A = (x = y)
A or (x $>$ y)

What does this code return?

How do we fix it?

Still Your Turn

What does the following line return?
((1 == -1) or (5 $>=$ 3)) and (not True)

Still Your Turn

What does the following line return?
((1 == -1) or (5 $>=$ 3)) and (not True)

What about the following lines?

x = 1
y = 0
A = not (x ! $=$ y)
B = (x - 3 $>=$ y)
(A or B) and (not A) and (not B) and (not False)

if...

if is a conditional statement that executes some specified code after checking if its expression is True.

```
x = 1
y = 1
if x == y:
    x = x + 1
```

What is the value of x?

Formatting

You must use a colon and then indent after the if!

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```
x = 1
y = 1
if x != y:
    x = x + 1
    y = x +1
```

What is the value of y?

Formatting

```
x = 1
y = 1
if x != y:
    x = x + 1
y = x +1
```

What is the value of y?

if... else

The **else** statement complements the **if** statement. An if/else pair says: “If this expression is true, run this indented code block; otherwise, run this code after the else statement.”

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```
animal = “dog”
x = 0
if animal == “animal”:
    x = 1
else:
    x = 2
    animal = “animal”
```

What are the values of animal and x after this code runs?

elif

elif is short for “else if.” It means exactly what it sounds like: “otherwise, if the following expression is true, do this!”

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```
x = ...
output = “ ”
if type(x) == int:
    output = “Integer”
elif type(x) == float:
    output = “Float”
elif type(x) == str:
    output = “String”
elif type(x) == bool:
    output = “Boolean”
else:
    output = “We haven’t learned this type yet!”
```

What does the above code do?

You're in a class with 3 exams. Each exam has a minimum of 0 and maximum of 100. Your lowest exam score is dropped, and your grade is the evenly-weighted average of the other 2 exams. Write code to compute your exam score.

```
exam1 = ...
exam2 = ...
exam3 = ...
grade = 0
# Write your code here
```