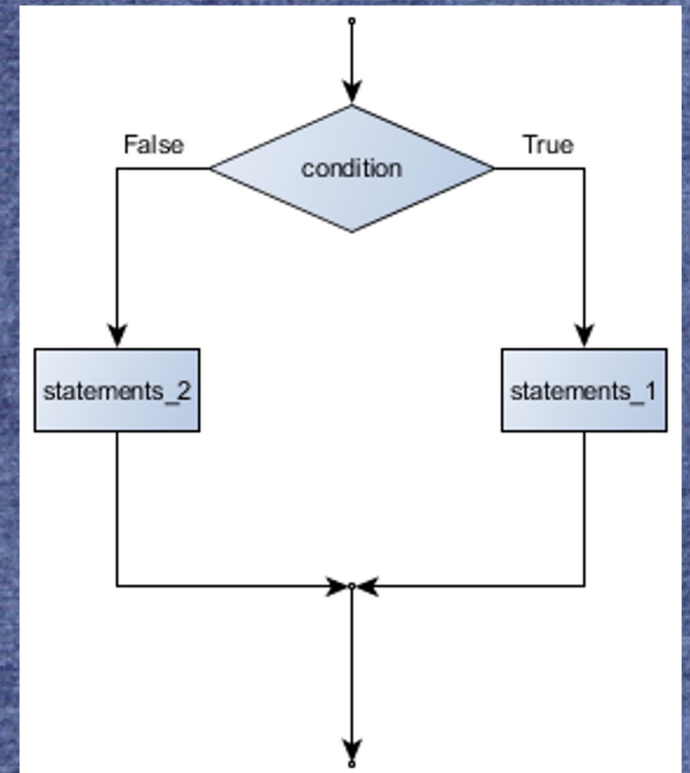


Decisions

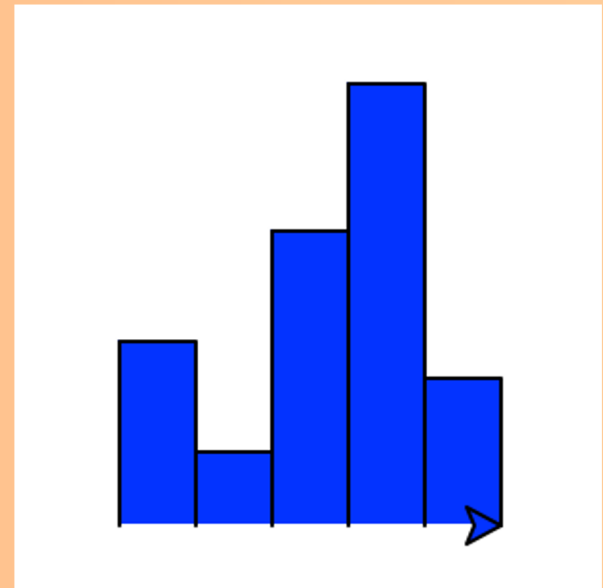


Decisions

- Why are decisions necessary?
- How do Decisions work on computers?
- If statement Syntax
- Comparison operators
- Logical operators
- Chained If statements

Decisions

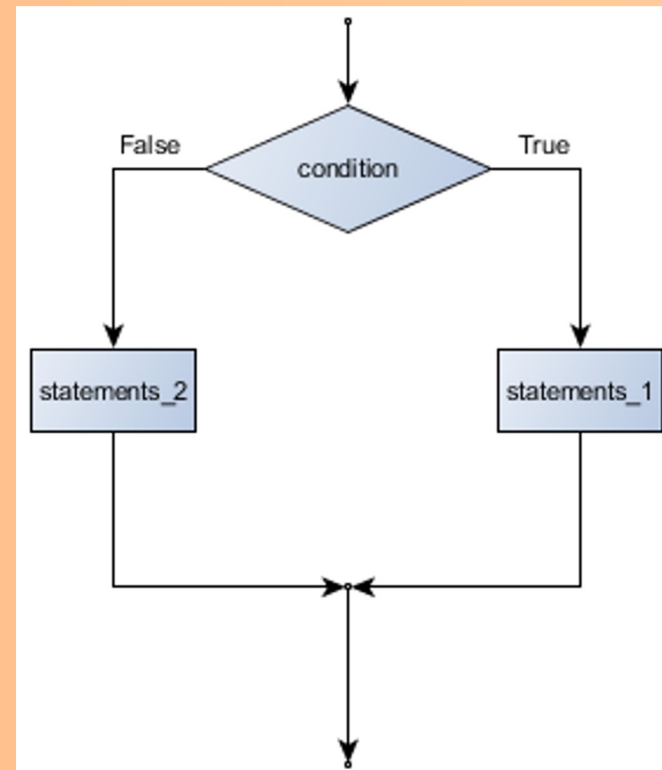
- Turtle Bar Chart function
 - change color of bar
- blue when bar is above 200
- red otherwise



Computer Decisions

- Yes/No

- Yes/Not Yes



Computer Decisions

- All decisions made by a computer
 - need to be a boolean decision

If Statement Syntax

if <condition>:

 statement(s)

If Statement Syntax

```
if <condition>:  
    statement(s)
```



Condition must be a
Boolean Value

Boolean Values

- True or False

- not true false

- not “true” “false”

Boolean Expression

- Expression that Evaluates True or False

Boolean Expression

- Comparison operators
- Logical operators

Comparison Operators

$x == y$ # x is equal to y

$x != y$ # x is not equal to y

$x > y$ # x is greater than y

$x < y$ # x is less than y

$x >= y$ # x is greater than or equal to y

$x <= y$ # x is less than or equal to y

Boolean Expression

• Which Expressions are Boolean Expressions?

1. True

2. $3 == 4$

3. $3 + 4$

4. $3 + 4 == 7$

5. "False"

Logical Operators

x and y	# True if both x and y are True
x or y	# True if x or y are True
not x	# not x negates x; True if x is false

Logical Operators

```
x = 5
```

```
print(x > 0 and x < 10)
```

```
n = 25
```

```
print(n % 2 == 0 or n % 3 == 0)
```

Logical Operators

```
x = 5
```

```
print(x == 0 or 6 or 7)
```

```
print(x == 0 or x == 6 or x == 7)
```

Logical Operators

What is the correct Python expression for checking to see if a number stored in a variable x is between 0 and 5.

- 1) $x > 0$ and < 5
- 2) $0 < x < 5$
- 3) $x > 0$ or $x < 5$
- 4) $x > 0$ and $x < 5$

If Statement Syntax

if <boolean expression>:

 statement(s)

If Statement Syntax

```
if x == 0:
```

```
    print(x, "is zero")
```

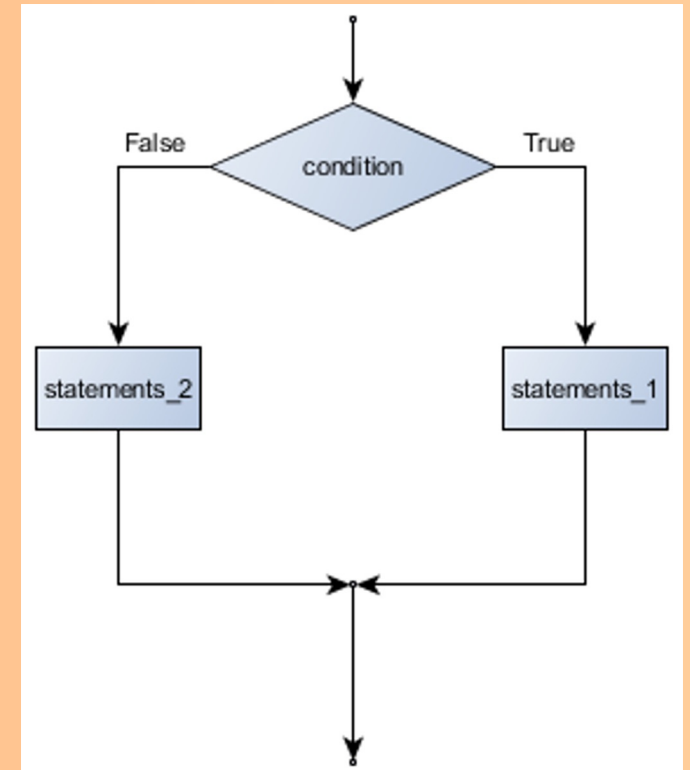
If Statement Syntax

if $x == 0$:

 print(x, "is zero")

else:

 print(x, "is not zero")



What does the following code print?

```
x = -10
```

```
if x < 0:
```

```
    print("The negative number ", x, " is not valid here.")
```

```
print("This is always printed")
```

- a. This is always printed
- b. The negative number -10 is not valid here
This is always printed
- c. The negative number -10 is not valid here

Will the following code cause an error?

```
x = -10
```

```
if x < 0:
```

```
    print("The negative number ", x, " is not valid here.")
```

```
else:
```

```
    print(x, " is a positive number")
```

```
else:
```

```
    print("This is always printed")
```

Chained If Statement Syntax

if $x < 0$:

```
    print('x is less than zero')
```

elif $x > 0$:

```
    print('x is greater than 0')
```

else:

```
    print('x is zero')
```

What will the following code print if $x = 3$, $y = 5$, and $z = 2$?

```
if x < y and x < z:
```

```
    print("a")
```

```
elif y < x and y < z:
```

```
    print("b")
```

```
else:
```

```
    print("c")
```

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