CONDITIONAL ITERATION

COMP130 – INTRODUCTION TO COMPUTING

DICKINSON COLLEGE

THE WHILE LOOP

- The `while` loop provides ***conditional repetition.***
  - When program execution reaches the ***loop header*** the ***loop condition*** is checked. As long as (i.e. while) the loop condition is `True` the statements in the ***loop body*** are executed over and over again.

```
magic_number=random.randint(1,5)

guess = int(input("What is your guess?"))
while guess != magic_number:
    guess = int(input("Nope! Guess again: "))

print("You got it!!!")
```

Loop Condition

Loop Header

Loop Body

WHILE LOOP IDIOM

- ***Setup:*** Variables used in the loop condition are initialized before the loop header.
- **Loop Condition**: Checked before each execution of the loop body.
- ***Update:*** Variables used in the loop condition are modified each time the loop body is executed. This allows the loop to ***terminate***.

```
init_investment = float(input('What is the initial investment? '))
interest_rate = float(input('What is the interest rate? '))

current_value = init_investment
compoundings = 0

while current_value < (init_investment*2):
    interest = current_value * interest_rate
    current_value = current_value + interest

    compoundings = compoundings + 1

print('The investment doubled in ' + str(compoundings) + ' compoundings.')
```

Setup

Loop Condition

Update

THE BREAK STATEMENT

- The ***`break` statement*** terminates the execution of a loop (i.e. it *breaks out* of the loop). When a break is executed, the program execution continues following the loop body.

```
import random

magic_number=random.randint(1,5)

while True:
    guess = int(input("Guess my number: "))

    if (guess == magic_number):
        break
    print("Nope! That's not it.")

print("You got it!!!")
```

Break Statement

FLOATING POINT ROUNDING ERRORS

- `float` values are often *approximations* of real values, which leads to ***rounding errors***. Thus, care is required when comparing `float` values.

```
x = 1/5
y = 3/5
z = x + x + x

equal = (y == z)                # not exactly equal...
print(equal)

epsilon = 0.00000001
equal = abs(y-z) < epsilon      # but close enough...
print(equal)
```

False due to rounding error

True