Basics of Programming

L02
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Overview

- Basics of programming
- L01
  - variables
  - loop
  - function definition
- L02
  - Scope
  - Variable types
  - Functions with more insight

Built-in function range()

- Syntax
```
range(m)    # from 0, 1,…, to m-1
range(m,n)  # from m,m+1,…, upto n-1
range(m,n,p)  # m,m+p,m+2p,…,exclude n
```
- Examples
```
range(6)
 0, 1, 2, 3, 4, 5
range(5,10)
 5,6,7,8,9
range(5,12,3)
 5, 8, 11
range(5,-1, -2)
 5, 3, 1
```

Scope

- How to define when (the code of) **for** loop ends?
  - By indentation (any number of spaces)
  - Generally, 2 (or 4) spaces, all should be same
- Examples

```
def rectangle(x, y):
    forward(x)
    left(90)
    forward(y)
    left(90)
    forward(x)
    left(90)
    forward(y)
    left(90)
rectangle(100,50)
```

Coding

- Comments:
  - Any thing after '#'
- Generally one statement per line
  - Two lines: first can be terminated with semicolon
- Examples

```
def rectangle(x, y):
    forward(x); left(90)
    forward(y); left(90)
    forward(x); left(90)
    forward(y);left(90)

rectangle(100,50); rectangle(50,100)
```

Variable types

- Variables are dynamically typed
  - at runtime.
- Integer
  - 2, 3, 4
- Foating points
  - 1.5, 2.3, …
- Strings (both single and double quotes)
  - "a", "abc", 'hello'
- Division operation
  - / (Floating point)
  - // (integer division)

Exercise : Integers

- print(7 // 2)
- print(7 // -2)
- print(7 % -2) # % is remainder operator
- print(-7 // 2)
- print(-7 % 2)
- print(-7 // -2)

- Recall: Euclidean formula

```
a = bq + r
```

Exercises : Hints

- 5-pointed star
  - ACEBDA
  - What is angle ∠CAB
    - 1/3 of angle ∠EAB = 108*1/3=36
  - What is angle ∠ACE
    - 180 - ∠CAB = 180 - 36 = 144
- Draw the 5 pointed star
- 7 pointed star: Compute the values
  - Draw 7-pointed star
- Generalize:
  - Draw n-pointed star
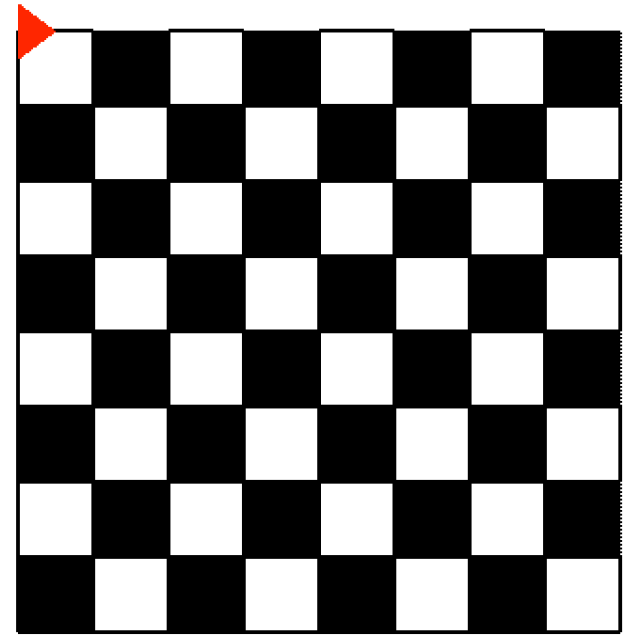   - n is odd
      - does not work for even. why?
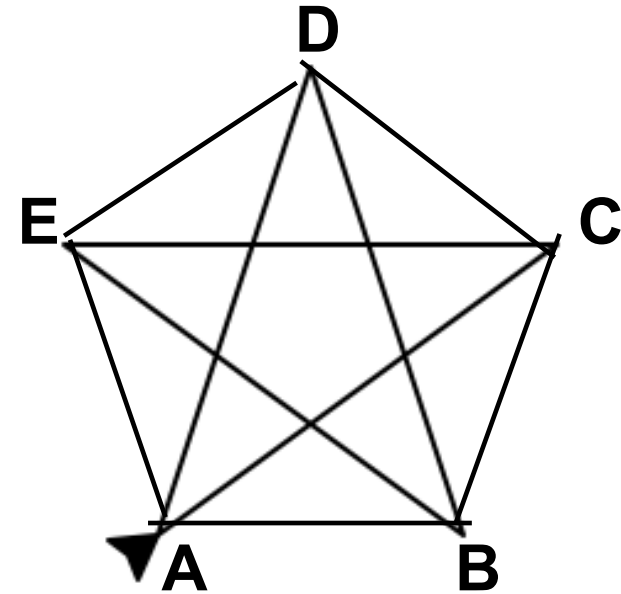
Nonagon (Polygon 9 sides)

z

x y

x

=180-y-2x

x

y
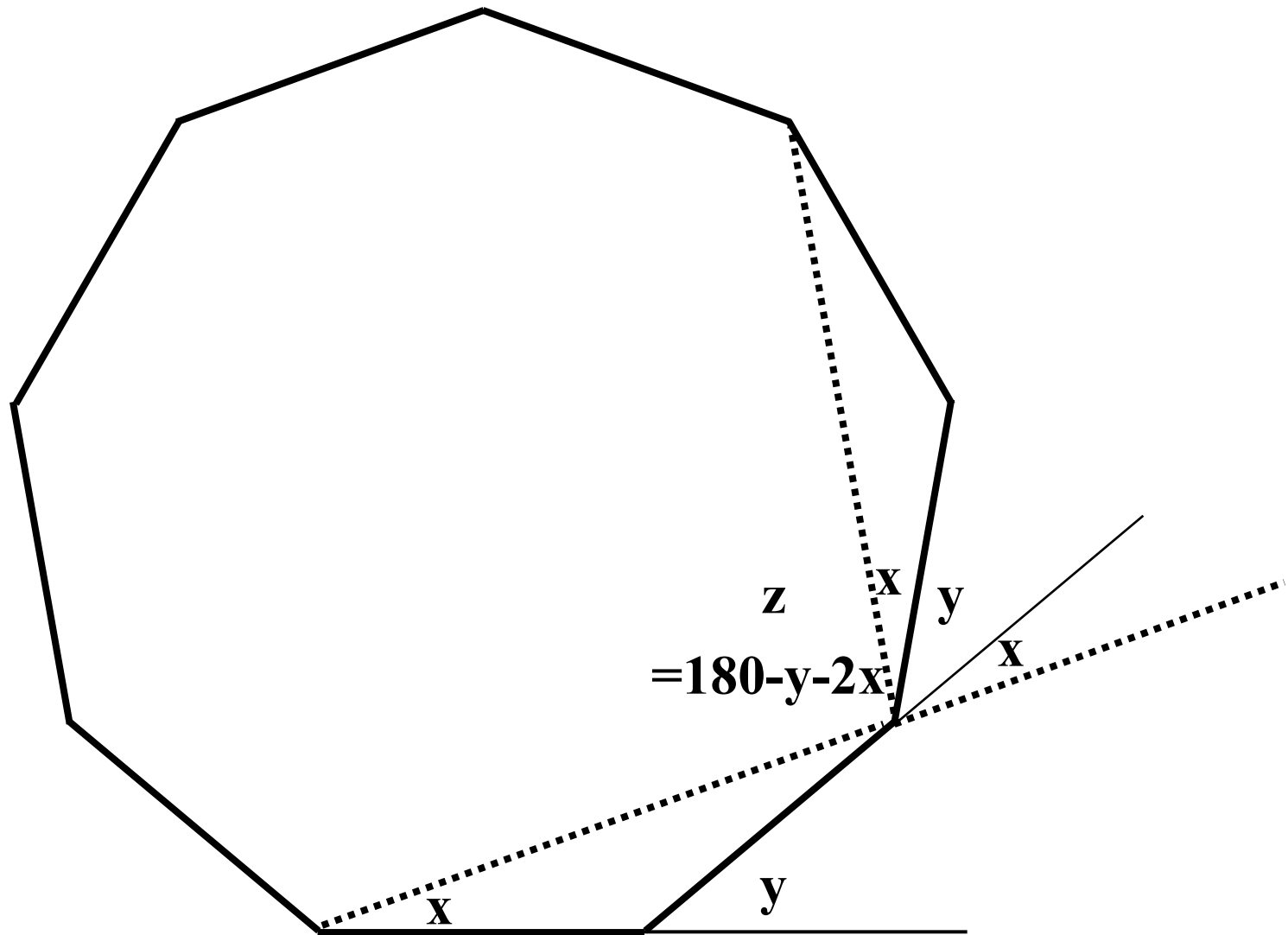
Chessboard

- A chessboard
  - Define function for white square
  - Define function for black square
  - Define function for a block of
    - white + black squares
    - black + white squares
  - Define function: even row number
  - Define function: odd row number
  - Define function **oerow**
    - odd row + even row
  - Repeat **oerow** 4 times

Questions