CS 301 - Lecture 4

P1 - due tomorrow (Wed) before midnight

Variables

Review

operators —— exponents **

add/sub
+, -

mul/div
*, /, //, %

signs
+, -

comparison
<, <=, >, >=,
==, !=

logical
not, and, or ——> highest
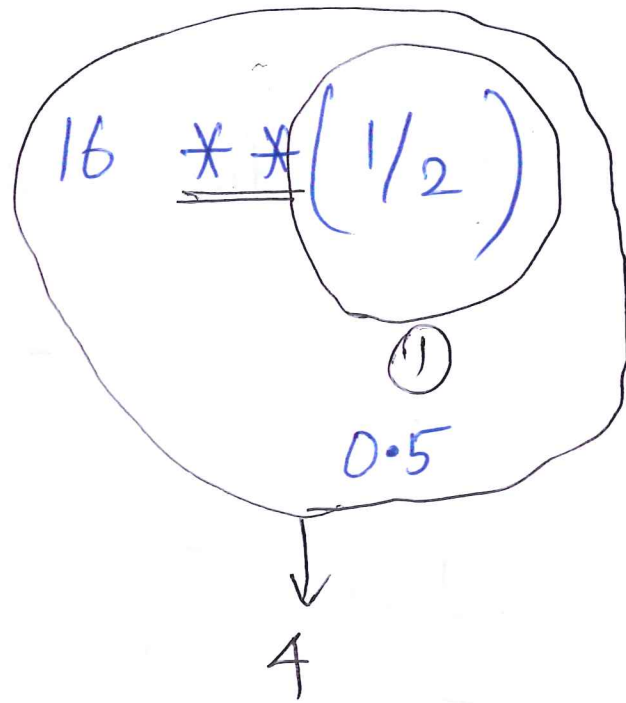precedence
(evaluated first)
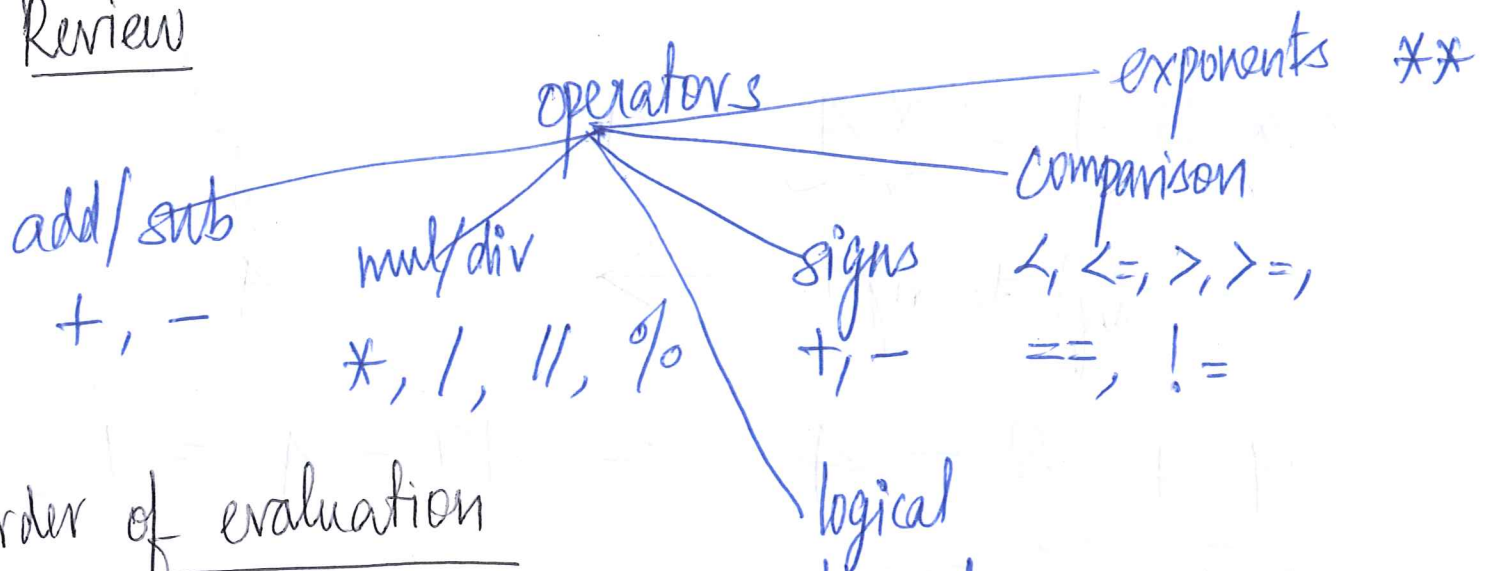
Order of evaluation

1. exponents **

2. signs +, - (+x, -x)

3. mul/div *, /, //, %

4. add/sub +, -

5. comparison ==, !=, <, <=, >, >=

6. not

7. and

8. or   (least precedence)
              (evaluated last)

②

$$3 * 3 + 2 * 4 - 16 ** (1/2)$$

$0.5 \rightarrow (1)$

$\rightarrow 4$

$$3 * 3 + 2 * 4 - 4$$

$\underbrace{} \quad \underbrace{}$

left to right $\longrightarrow$

$$9 + 8 - 4 = 17 - 4 = \underline{\underline{13}}$$

$\underbrace{} \quad \underbrace{}$

$$2 ** 3 ** 4 \qquad \text{(exception)}$$

$\longleftarrow$ right to left

$$= 2 ** 3^4$$

$$= 2 ** 81 = \underline{\underline{2^{81}}}$$

(tan)

③

2 > 2 / -2 - -1   or   -2 - 2 + 2 ≤ 4

and   -1 > -2 * -1 + 0

Expressions

$3.14 * 7 * 7$

Variable

area | 153.86 |

constant

$\pi = 3.14$

$e = 2.71$

$$y = f(x) = x^2$$

x	1	2	-1	-2	0
y	1	4	1	4	0

area = 3.14 * 7 * 7

↓

assignment operator.

④

$$Z = x + y$$

$\underbrace{}$ LHS $\underbrace{x + }$ RHS

$$\downarrow \qquad \downarrow$$

$$1 + 2$$

$\underbrace{1 + 2}$

$$\boxed{Z = 3}$$

$Z\boxed{3}$

$$\boxed{X = \boxed{X} + 1}$$

$$X = \boxed{1 + 1}$$

$$2$$

Errors (Bugs)

Syntax error   Runtime error   Semantic errors

e.g., NameError

e.g., ZeroDivisionError.
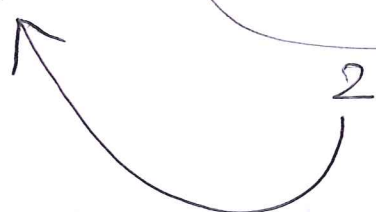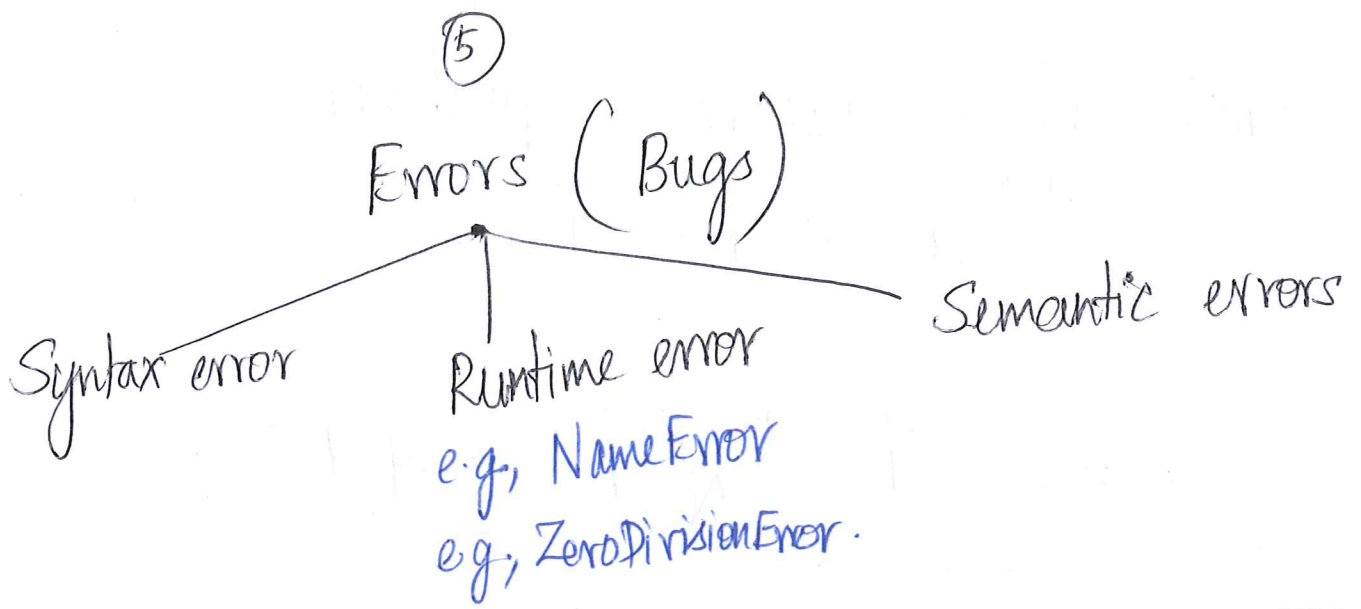
Naming Variables

Variable names — case sensitive.

Naming Rules

1. Only use letters, numbers, & underscores.

2. Don't start with a number.

3. Don't use Python keywords.

        e.g. class

Roots of a quadratic equation ⑥

$$ax^2 + bx + c = 0$$

$$x = \frac{-b \pm \sqrt{\boxed{b^2 - 4ac}}}{2a} \longrightarrow det$$

$$a = 3, \qquad b = 2, \qquad c = -1$$

$$3x^2 + 2x - 1 = 0$$

$$det = b^2 - 4ac = 4 + 12 = \underline{16}$$

$$x = \frac{-2 \pm \sqrt{16}}{6} = \frac{-2 \pm 4}{6} = \frac{2}{6}, -1$$

or

$$\frac{1}{3}, -1$$

$$\underline{0.33, \boxed{-1}}$$

$$3(-1)^2 + 2(-1) - 1 = 0$$

$$3 - 2 - 1 = 0$$

$$\det > 0 \implies \text{2 real roots}$$

$$\det \doteq 0 \implies \text{1 real roots.}$$

$$\det < 0 \implies \text{no real roots}$$
$$\text{(or)}$$
$$\text{roots are imaginary}$$

$$\boxed{\sqrt{-1} = i}$$

$$a = 2, \quad b = -6, \quad c = 5 \qquad \underline{\underline{2 + 3i}}$$

$$\boxed{2x^2 - 6x + 5 = 0}$$

$$x_0 = \frac{6 \pm \sqrt{36 - 40}}{4} = \frac{6 \pm \sqrt{-4}}{4}$$

$$= \frac{6 \pm 2\sqrt{-1}}{4} = \frac{3}{2} \pm \frac{\sqrt{i}}{2} = \underline{\underline{1.5 \pm 0.5i}}$$