Maths x Modules

1. Random
2. Maths
3. Statistics
4. Fractions

1. Fractions

p/q = 1/2, 3/5

↳ Fraction (num=0, den=1)
Fraction (float)
Fraction (string)
limit_denominator (den=10)

numerator
denominator

```
import fractions
pf(fractions.Fraction(1,2))
                1/2
f2= fractions.Fraction(0.2)
                3602818014
f3=fractions.Fraction('0.3')
                3/10
```

f2 = f2.limit_denominator(10)

(1,5)

$\frac{1}{5} + \frac{1}{2}$

f1+f2

$\frac{7}{10}$

↳ f1*f2 = 1/10

↳ f1-f2 = 3/10

↳ f1.denominator

9

f1.numerator

1

↳ L = [(1,2),(4,9),(6,8)]

1/2, 4/9, 3/4

~~for~~ for n,d in L:

print(n,d)

↳ Random ( )

- ↳ random
- ↳ uniform
- ↳ randint
- ↳ randrange
- ↳ seed ( )
- ↳ choice

↳

↳ random( ) } → intesey / float b/w (0,1)
0 - 1

↳ uniform(1,10) float number

↳ random.randint → int

↳

```
import random
pf(random.random())
pf(random.random())
pf(random.uniform(1,10))
pf(random.uniform(1,10))
random.randint(1,10)
random.randrange(1,10,3)
random.seed(10)
```

0.04
0.88
1.89
4.88
1
7

```
random.random()          0.57
random.random()          0.42
random.random()          0.578

random.seed(10)          0.57
random.random()          0.42
random.random()          0.578
random.random()
```

```
L = [1,3,5,7,9]                    3
random.choice(L)          → 3
random.choices(L, k=2)
                          → 3 5

L = [1,3,5,7,9]
    [1,7,3,5,9]
```

Math

math.ceil( ) 12.3 → 13
math.floor( ) 12.9 → 12
math.abs(-5) → 5
math.fmod( ) %. reminder

```
impolt math
math.Ceil(12.3))  -13
math.floor(12.9) -12
math.~~fabs~~(-5) -5.0
f.mod(11,3)  2.0
reminder(12,5) 2.0
      (13,5) -2.0 ✓
.fmod(12,5) → 2.0 ✓
```

2. sqrt( ) $\sqrt{25} = 5.0$
isqrt( ) $\sqrt{26} = 5$ ✓ (int)

.pow( )
.factorial

```
math.sqrt(25)  5.0
math.sqrt(27)  5.19
math.isqrt(27)  5
math.pow(2,9)  512.0
math.factorial(5)  120
```

. gcd (35, 21) → 7 ✓

. perm $nPr = \frac{n!}{(n-r)!}$ $5P_2 = \frac{5!}{3!} = 20$ ✓

. comb $\rightarrow nCr = \frac{n!}{(n-r)!\,r!}$ $6C_4 = 2$

$\frac{6 \times 5}{4!\,2} = \frac{15}{}$

15

math.prod } [1,2,3,4,5] → 120

fsum } [1,2,3,4,5] → 15.0

→ radians
. degree

30° → π/6 → 3.1415

90° → π/2 →

math.sin(30) → 1/2

math.cos(60) → 1/2

math.tan(45) → 1

. radians(30) → pi/6 → 0.5235

. radians(180) → pi → 3.14

math.sin(math.radians(30)) → 0.499

math.cos(math.radians(60)) → 0.5

math.tan(math.radius(45)) → 1
0.99

↳ .log( ) — e
.log10( ) — 10
.log2( ) → 2

↳ math.log2(1024) — 10.0

$\log_2 10 \rightarrow 10$ ✓

$\log_2(256) - 2^8 - 8.0$

↳ log10(1000) → 3.0 ✓

log10(900) — 2.95

.log(math.e) → 1.0 → 1

math.log(10) → 2.3025

↳ .pi
.e
.inf
.nan
} infinity

math.pi — 3.1415

math.e → 2.71

math.inf → inf

math.nan → nan

Statistics

mean()
median()
mode()

data = [1,2,3,4,5]

data = [1,2,1,2,3,1,2,3,4,1]

harmonic_mean()
median_high()
median_low()
pstdev()
pvariance()
stdev
variance

mean $\frac{1+2+3+4+5}{5}$

$= \frac{15}{5} = 3$

↳ harmonic_mean

$\frac{5}{\frac{1}{1}+\frac{1}{2}+\frac{1}{3}+\frac{1}{4}+\frac{1}{5}}$

↳ [1,2,3,4,5] Mean

3

[1,2,3,4,5,6] $\frac{3+4}{2}$

[1,2,3,4,5,6] Median_low 3

[1,2,3,4,5,6] Median_high 4

[1,2,3,4,5,6] =

```
import statistics as s
s.mean([1,2,3,4,5])
↳ 3
s.hoemonic_mean([1,2,3,4,5])
↳ 2.189781
↳ s.median([1,2,3,4,5])
        3
↳ s.median([1,2,3,4,5,6])
        3.5
↳ s.median_low([1,2,3,4,5,6])
        3
↳ s.median_high([1,2,3,4,5,6])
        4
↳ s.median_high([1,2,30,50,51,52])
                50
        low([1,2,30,50,51,52])
                50
↳ s.median([1,2,30,50,51,52])
    40.0
```

mode

data = [1, 2, 1, 2, 3, 1, 2, 3, 4, 1]

1

[2, 2, 5, 5, 88]

↳ s.mode[ ]

2

↳ [8, 8, 5, 5, 2, 2]

8

↳ [1, 1, 1, 2, 2, 3]

1

↳ [1, 1, 1, 2, 2, 3]

1

↳ [4, 4, 4, 1, 1, 1, 2, 2, 2, 3]

4

→ pstdeV
pvaliance
stdeV
Valiance

mean = 3

$(1-3)^2 = 4$

$(2-3)^2 = 1$

$(3-3)^2 = 0$

$(4-3)^2 = 1$

$(5-3)^2 = 4$

$\frac{4+1+1+4}{4}$

$\frac{10}{4} = 2.5$

std Valiance

$\sqrt{2}$ → standard deviation

↳ stdeV
variance } sample data

p stdeV
pVariance } complete data