Mastering Python

الدرس #9_1

احصاء ورياضيات Math & Statistics

By:

Hussam Hourani

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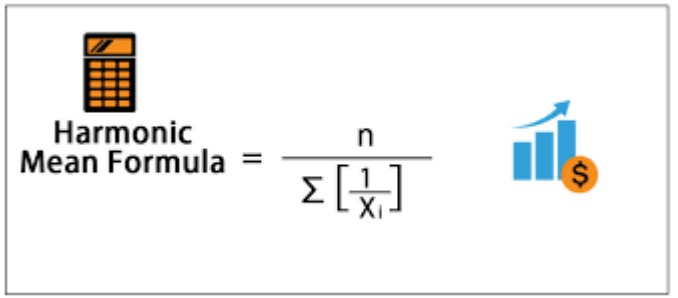
Statistics Lib - مكتبة الاحصاء

Averages and measures of central location

mean()	Arithmetic mean (“average”) of data.المتوسط الحسابي
harmonic_mean()	Harmonic mean of data.الوسط التوافقي
median()	Median (middle value) of data. الوسيط
median_low()	Low median of data.
median_high()	High median of data.
median_grouped()	Median, or 50th percentile, of grouped data.
mode()	Mode (most common value) of discrete data.



Measures of spread

pstdev()	Population standard deviation of data.
pvariance()	Population variance of data.
stdev()	Sample standard deviation of data.
variance()	Sample variance of data.

Statistics Examples

```
import statistics as st
```

`st.mean([1, 2, 3, 4, 4])`	Output	`2.8`
`st.harmonic_mean([2.5, 3, 10])`	Output	`3.6`
`st.median([1, 3, 5, 7])`	Output	`4.0`
`st.median_low([1, 3, 5])`	Output	`3`
`st.median_high([1, 3, 5, 7])`	Output	`5`
`st.median_grouped([52, 52, 53, 54])`	Output	`52.5`
`st.mode([1, 1, 2, 3, 3, 3, 3, 4])`	Output	`3`

`st.pstdev([1.5, 2.5, 2.5, 2.75, 3.25, 4.75])`	Output	`0.986893273527251`
`st.Pvariance([0.0, 0.25, 0.25, 1.25, 1.5])`	Output	`0.365`
`st.stdev([1.5, 2.5, 2.5, 2.75, 3.25, 4.75])`	Output	`1.0810874155219827`
`st.st.variance([0.0, 0.25, 0.25, 1.25, 1.5])`	Output	`0.45625`

Practice Statistics

If X=[3, 1.5, 4.5, 6.75, 2.25, 5.75,2.25], find :

• print(st.mean(X))	3.7142857142857144
• print(st.harmonic_mean(X))	2.8769027134348115
• print(st.median(X))	3
• print(st.median_low(X))	3
• print(st.median_high(X))	3
• print(st.median_grouped(X))	3.0
• print(st.mode(X))	2.25
• print(st.pstdev(X))	1.8391990270833904
• print(st.pvariance(X))	3.382653061224 49
• print(st.stdev(X))	1.9865619978819116
• print(st.variance(X))	3.9464285714285716

Random Lib - مكتبة العشوائيات

```
import random
print( random.random() )
```

Output

```
0.14093714643446953
```

```
print ( random.randrange(6) )
```

Output

```
4
```

```
print ( random.choice(['apple',
'banana']) )
```

Output

```
apple
```

```
print ( random.sample(range(100), 5) )
```

Output

```
[64, 34, 36, 97, 73]
```

```
print ( random.choice('abcdefghij') )
```

Output

```
a
```

```
items = [1, 2, 3, 4, 5, 6, 7]
random.shuffle(items)
print( items )
```

Output

```
[1, 4, 5, 6, 3, 2, 7]
```

```
print ( random.randint(1, 10) )
```

Output

```
5
```

```
print ( random.randrange(0, 101, 2) )
```

Output

```
56
```

```
print  ( random.uniform(1, 10))
```

Output

```
4.399767896861064
```

Practice Random

Find the following :

- print(random.random())
- print (random.randrange(100))
- print (random.choice(['Jordan', 'USA', 'UK']))
- print (random.sample(range(100), 5))
- print (random.choice('abcdefghij'))
- items = [11, 12, 30, 14, 35, 66, 17]
- random.shuffle(items)
- print(items)
- print (random.randint(10, 20))
- print (random.randrange(0, 101, 2))
- print (random.uniform(1, 100))
- print()

0.4836129400608338
12
Jordan
[79, 9, 6, 35, 68]
d
[14, 30, 12, 17, 66, 11, 35]
10
88
96.0833805175241

Math Lib - مكتبة الرياضيات

Number-theoretic and Representation Functions

ceil(x)
copysign(x, y)
fabs(x)
factorial(x)
floor(x)
fmod(x, y)
frexp(x)
fsum(iterable)
gcd(a, b)
isclose()
isfinite(x)
isinf(x)
isnan(x)
ldexp(x, i)
modf(x)
trunc(x)

Power and Logarithmic Functions

exp(x)
expm1(x)
log(x[, base])
log1p(x)
log2(x)
log10(x)
pow(x, y)
sqrt(x)

Angular Conversion

degrees(x)
radians(x)

Trigonometric Functions

acos(x)
asin(x)
atan(x)
atan2(y, x)
cos(x)
hypot(x, y)
sin(x)
tan(x)

Constants

math.pi
math.e
math.tau
math.inf
math.nan

Special Functions

erf(x)
erfc(x)
gamma(x)
lgamma(x)

Hyperbolic Functions

acosh(x)
asinh(x)
atanh(x)
cosh(x)
sinh(x)
tanh(x)

Math Examples

```
import math

print (pi: %.40f' % math.pi)
print ('e: %.40f' % math.e)
```

Output

```
pi: 3.1415926535897931159979634685441851615906
e: 2.7182818284590450907955982984276488423347
```

```
print ('arcsine(%.1f)    = %5.2f' % (n,
math.asin(n)))
print ('arccosine(%.1f)  = %5.2f' % (n,
math.acos(n)))
print ('arctangent(%.1f) = %5.2f' % (n,
math.atan(n)))
```

Output

```
arcsine(0.5)    =  0.52
arccosine(0.5)  =  1.05
arctangent(0.5) =  0.46
```

```
n = 100.7
print(math.floor(n))
print(math.ceil(n))
```

Output

```
100
101
```

```
print ( math.fsum([2,6,8]))
print ( sum([2,6,8]))
```

Output

```
16.0
16
```

```
print(math.pow(2, 3))
```

Output

```
8.0
```

```
print(math.sqrt(9))
```

Output

```
3.0
```

Master in Software Engineering

Hussam Hourani has over 25 years of Organizations Transformation, VROs, PMO, Large Scale and Enterprise Programs Global Delivery, Leadership, Business Development and Management Consulting. His client experience is wide ranging across many sectors but focuses on Performance Enhancement, Transformation, Enterprise Program Management, Artificial Intelligence and Data Science.