PEP-628

The world's oldest bug

@timl - Tim Leslie[1]

[1]Breakaway Consulting

PyCon AU, 2017

Two definitions of a circle

Definition

A continuous set of points with a constant diameter

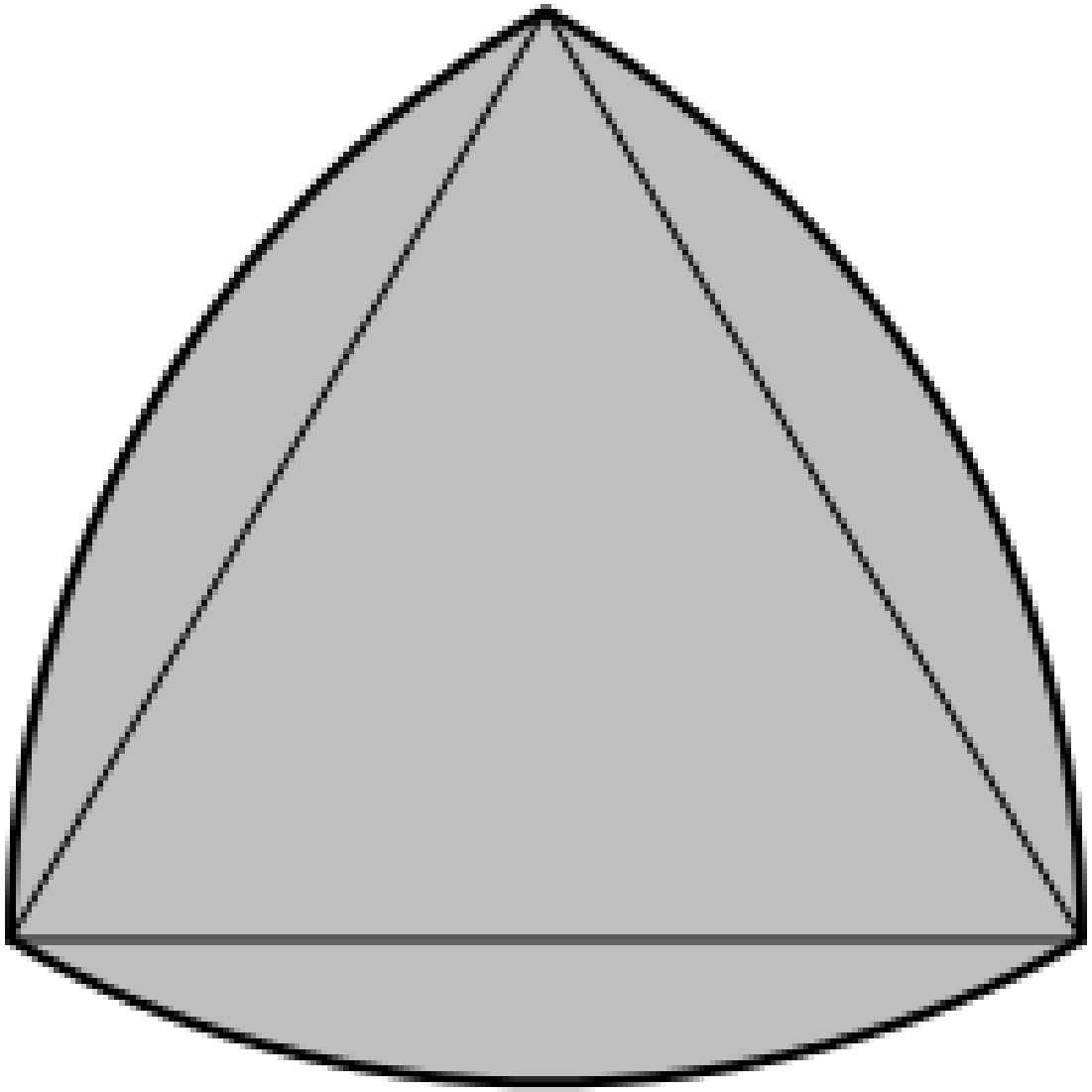
– No-one (ever)

Definition

The set of all points a constant distance (radius) from a center point

– Everyone (all the time)

Constant Diameter - Not a circle



Definition of the circle constant

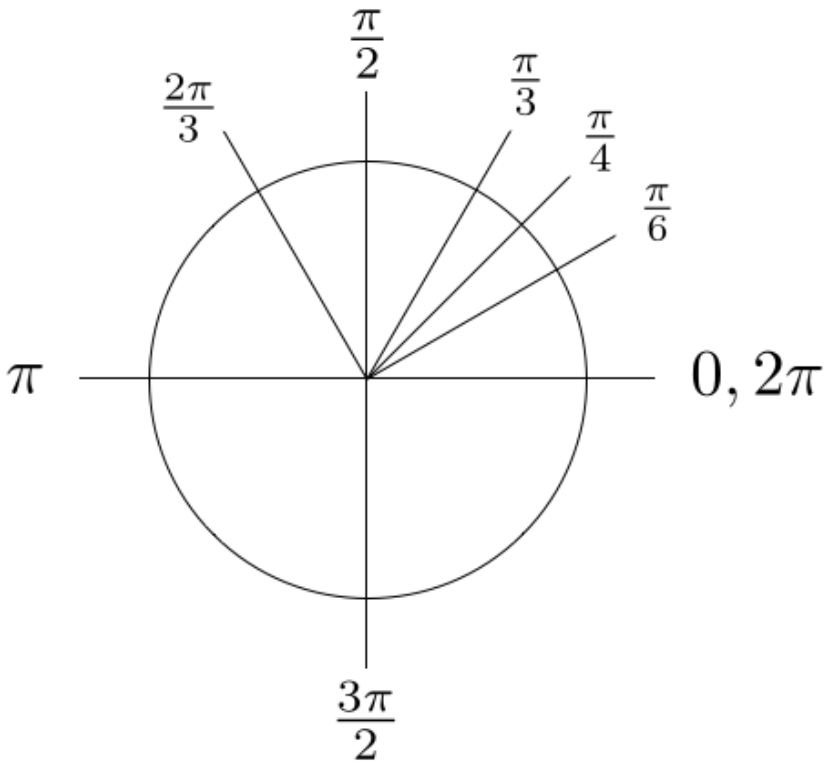
$$\pi = \frac{\text{circumference}}{\text{diameter}}$$

Definition of the circle constant

$$\pi = \frac{\text{circumference}}{\text{diameter}}$$

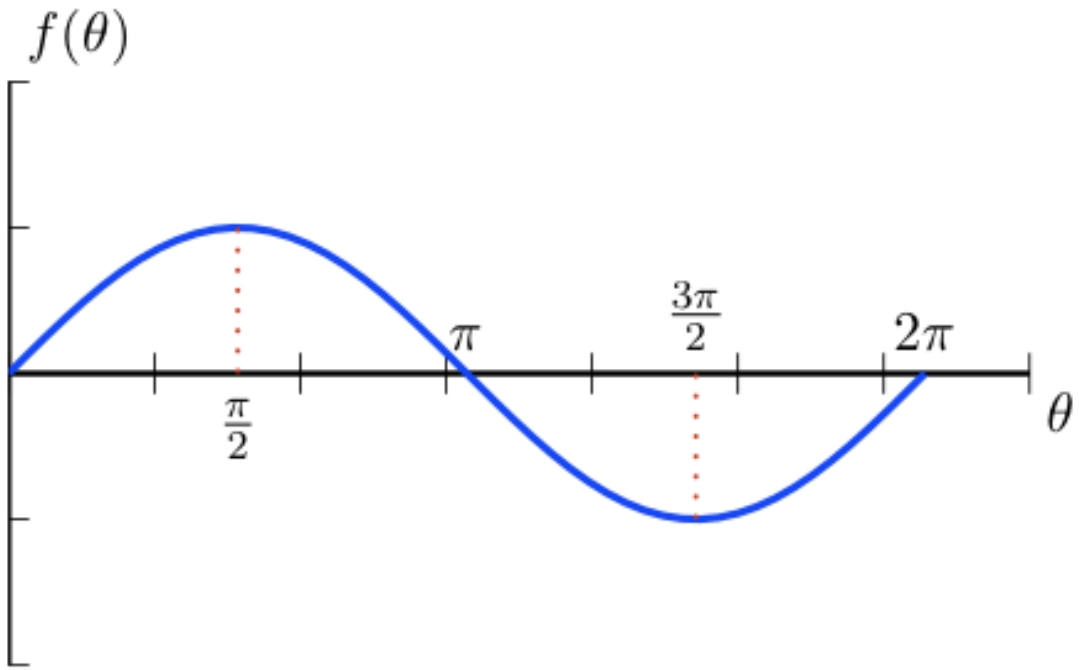
This is a bug!

Impacts of the bug



π represents half a circle

Impacts of the bug



π represents half a period of a sine wave

The workaround - 2π

$$\frac{1}{\sqrt{2\pi}\sigma} e^{-\frac{(x-\mu)^2}{2\sigma^2}}$$

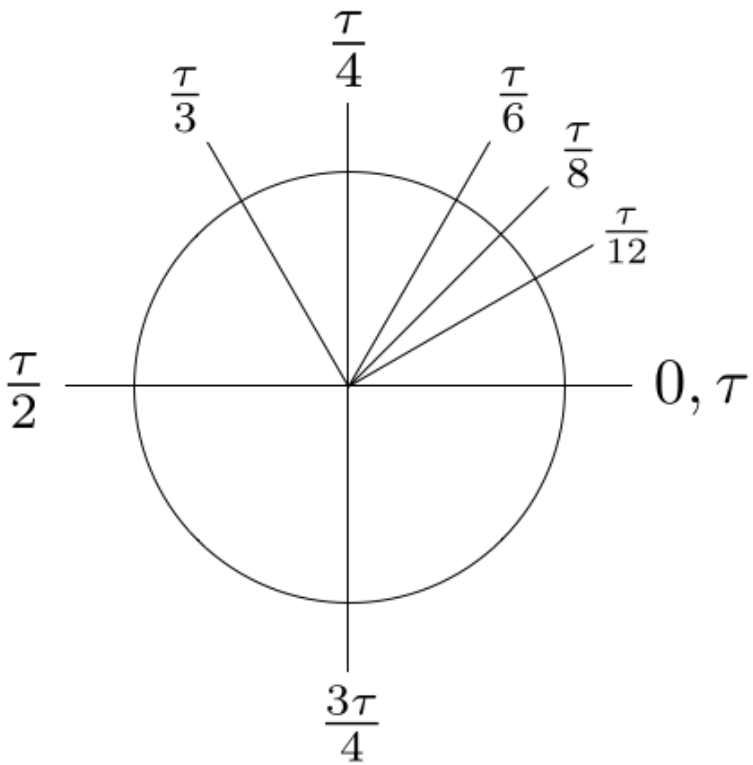
$$F(k) = \int_{-\infty}^{\infty} f(x) e^{-2\pi i k x}$$

$$\zeta(2n) = \frac{B_n}{2(2n)!}(2\pi)^{2n}$$

The solution - tau (τ)

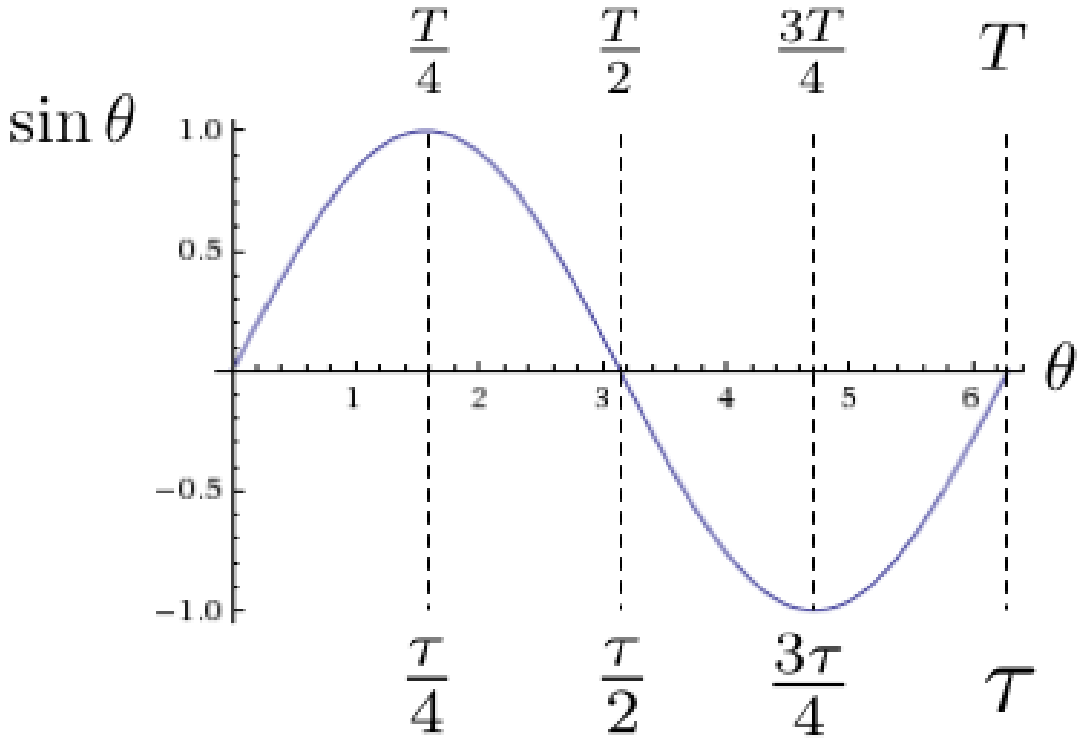
$$\tau \equiv \frac{\text{circumference}}{\text{radius}} = 2\pi$$

The solution - tau (τ)



τ represents a full circle

The solution - tau (τ)



τ represents a full period of a sine wave

The solution - tau (τ)

$$\frac{1}{\sqrt{\tau}\sigma} e^{-\frac{(x-\mu)^2}{2\sigma^2}}$$

$$F(k) = \int_{-\infty}^{\infty} f(x) e^{-\tau ikx}$$

$$\zeta(2n) = \frac{B_n}{2(2n)!} \tau^{2n}$$

A bug in python

June, 2011, Nick Coghlan

"We should add tau to the math module!"
PEP-628, issue12345

July, 2011, Guido

"No"

Guido shares his benevolence

August, 2016, Guido

"This PEP is now accepted and math.tau will be a part of Python 3.6.
Happy birtday Nick!"

Victory

```
Python 3.6.1 |Continuum Analytics, Inc.| (default, May 11 2017, 13:04:09)
[GCC 4.2.1 Compatible Apple LLVM 6.0 (clang-600.0.57)] on darwin
Type "help", "copyright", "credits" or "license" for more information.
>>> from math import tau, pi
>>> print(tau)
6.283185307179586
>>> tau == 2*pi
True
```

Further Reading

- https://tauday.com/
- https://bugs.python.org/issue12345
- https://www.python.org/dev/peps/pep-0628/
- @timl on twitter, pyconau.slack.com