The most beautiful formulae/theorems/identities in mathematics

by S. Parthasarathy - Thursday, April 02, 2015

https://gonitsora.com/the-most-beautiful-formulae-theorems-identities-in-mathematics/

This is my personal collection of formulae/theorems which I consider lovely. By ``lovely", I mean objects which possess a certain degree of Elegance and Simplicity. The formulae/theorems are listed in no particular order.

Pythagoras' theorem

The most popular and fascinating theorem in Euclidean geometry takes the first place in the list.

If AB, BC and AC are three sides of a right angled triangle ABC, where AC is the hypotenuse, then

$latex AC^2 =AB^2+BC^2$

Euler's formula

$latex e^{i\pi}+1=0$, where $latex e$ is the Euler's number.

Heron's formula

$latex A=\sqrt{s(s-a)(s-b)(s-c)}$. where $latex A$ is the area of a triangle whose sides are of length $latex a,b,c$ and perimeter is $latex 2s$.

Bayes theorem

$latex P(A|B)*P(B)= P(B|A)*P(A)$

Or

$latex P(A|B)=\frac{P(B|A)*P(A)}{P(B)}$

Sine rule
If A,B,C are vertices of a triangle, and sides a,b,c are a = BC, b = CA, c = AB then

$latex \frac{a}{sin(A)}=\frac{b}{sin(B)}=\frac{c}{sin(C)}$

Cayley - Hamilton theorem

every square matrix over a commutative ring (such as the real or complex field) satisfies its own

characteristic equation.

Euclid's algorithm

If a and b are integers and a > b, then gcd(a, b) = gcd(a (mod b), b)

Trigonometric gem 1

sin(x - y) sin(x + y) = (sin(x) - sin(y)) (sin(x) + sin(y))

Trigonometric gem 2

X+Y+Z = XYZ if
X = tan(A)
Y = tan(B)
Z = tan(C)

and $latex A+B+C = \pi$

Of course, this list is undeniably incomplete. There will be more entries, as I discover more gems.
