Definitions

We define a **radian** as a measure of an angle such that π radians is equivalent to 180°.

We define the **polar coordinate** (r, θ) as the point $(r, 0)$ rotated counterclockwise around $(0, 0)$ by θ. (Whether this is θ degrees or θ radians depends on context.)

Then, we define the rectangular coordinates of $(1, \theta)$ as $(\cos(\theta), \sin(\theta))$. And, we define $\tan\theta = \frac{\sin\theta}{\cos\theta} = \frac{y}{x}$, where (x, y) is the rectangular form of $(1, \theta)$.

We define $\csc\theta = \frac{1}{\sin\theta}$, $\sec\theta = \frac{1}{\cos\theta}$, $\cot\theta = \frac{1}{\tan\theta}$, $\sin(\sin^{-1}(x)) = x$, $\cos(\cos^{-1}(x)) = x$, and $\tan(\tan^{-1}(x)) = x$. Similar inverse functions exist for the reciprocal functions.

Notation

Take $\triangle ABC$ and denote BC, AC, AB as a, b, c and $\angle BAC, \angle ABC, \angle ACB$ as α, β, γ, respectively. We also let s denotes the semiperimeter of $\triangle ABC$, r denote the inradius of $\triangle ABC$, and R denote the circumradius of $\triangle ABC$.

Formulas

The Law of Sines states $\frac{a}{\sin(\alpha)} = \frac{b}{\sin(\beta)} = \frac{c}{\sin(\gamma)} = 2R$.

The Law of Cosines states $c^2 = a^2 + b^2 - 2ab \cdot \cos(C)$.

The Law of Tangents states $\frac{a-b}{a+b} = \frac{\tan(\frac{1}{2}(A-B))}{\tan(\frac{1}{2}(A+B))}$.

The Law of Cotangents states $\frac{\cot(A)}{s-a} = \frac{\cot(B)}{s-b} = \frac{\cot(C)}{s-c} = \frac{1}{r}$.