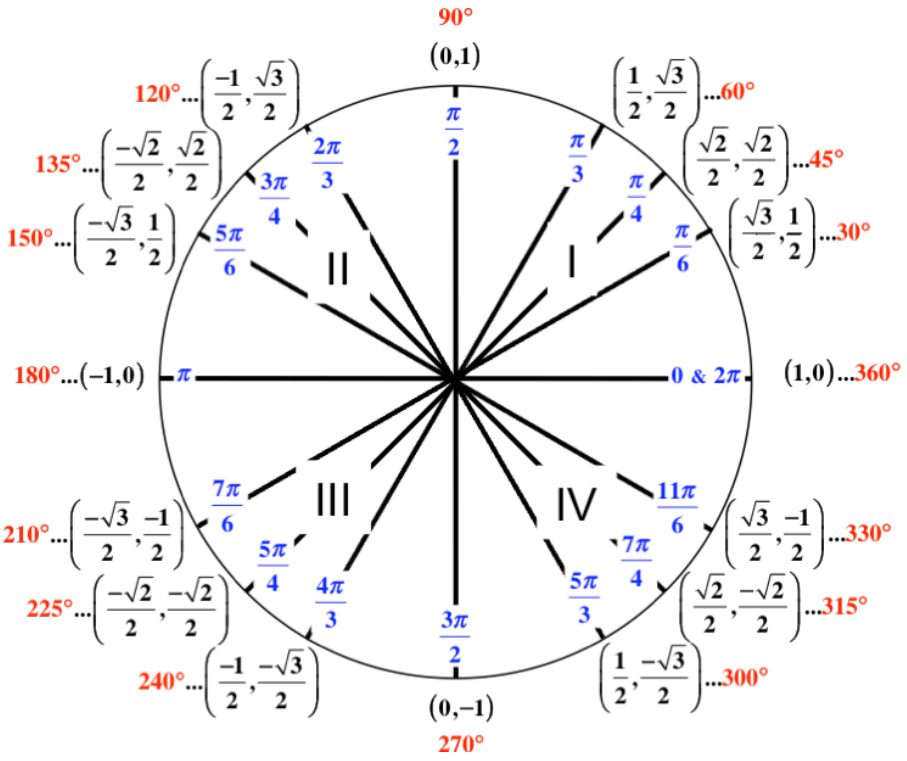
Pre-Calculus Study Sheet



$$\sin\theta = \frac{y}{r}$$

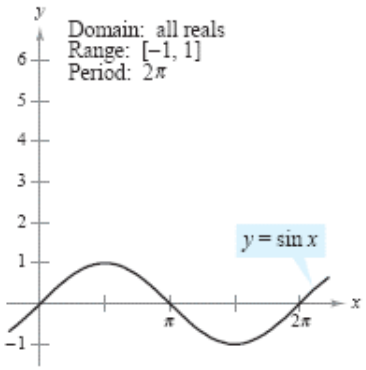
$$\cos\theta = \frac{x}{r}$$

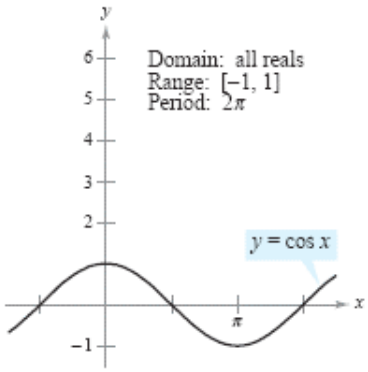
$$\tan\theta = \frac{y}{x}$$

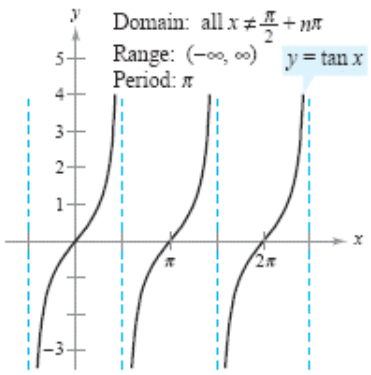
$$\csc\theta = \frac{r}{y}$$

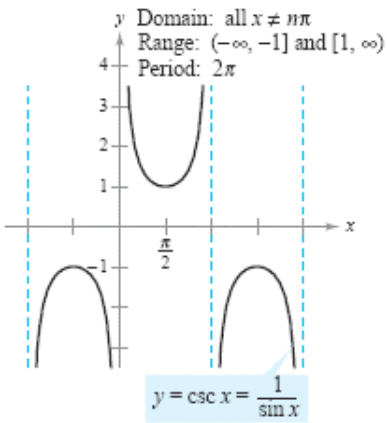
$$\sec\theta = \frac{r}{x}$$

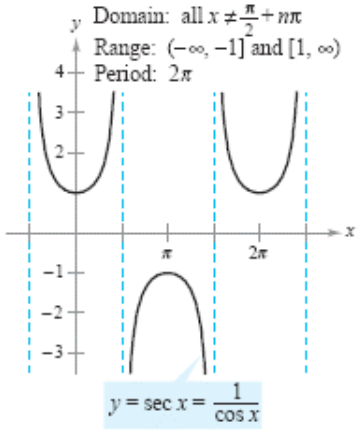
$$\cot\theta = \frac{x}{y}$$

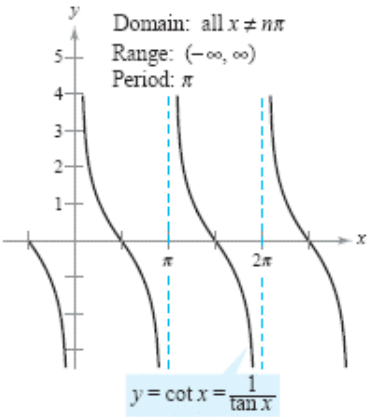












The graphs of the six trigonometric functions

Pre-Calculus Study Sheet

Inverse Functions:

$y = \sin^{-1} x$ Domain: $-1 \le x \le 1$, Range: $-\frac{\pi}{2} \le y \le \frac{\pi}{2}$

$y = \cos^{-1} x$ Domain: $-1 \le x \le 1$, Range: $0 \le y \le \pi$

$y = \tan^{-1} x$ Domain: $-\infty < x < \infty$, Range: $-\frac{\pi}{2} < y < \frac{\pi}{2}$

$y = \csc^{-1} x$ Domain: $|x| \ge 1$, Range: $-\frac{\pi}{2} \le y \le \frac{\pi}{2}$; $y \ne 0$

$y = \sec^{-1} x$ Domain: $|x| \ge 1$, Range: $0 \le y \le \pi$; $y \ne \frac{\pi}{2}$

$y = \cot^{-1} x$ Domain: $-\infty < x < \infty$, Range: $0 \le y \le \pi$

Sum and difference formulas:

$\cos(\alpha + \beta) = \cos\alpha\cos\beta - \sin\alpha\sin\beta$ $\quad \tan(\alpha + \beta) = \frac{\tan\alpha + \tan\beta}{1 - \tan\alpha\tan\beta}$

$\cos(\alpha - \beta) = \cos\alpha\cos\beta + \sin\alpha\sin\beta$

$\sin(\alpha + \beta) = \sin\alpha\cos\beta + \cos\alpha\sin\beta$ $\quad \tan(\alpha - \beta) = \frac{\tan\alpha - \tan\beta}{1 + \tan\alpha\tan\beta}$

$\sin(\alpha - \beta) = \sin\alpha\cos\beta - \cos\alpha\sin\beta$

Double-angle Formulas:

$\cos(2\theta) = 2\cos^2\theta - 1$ $\quad \cos(2\theta) = \cos^2\theta - \sin^2\theta$ $\quad \cos(2\theta) = 1 - 2\sin^2\theta$

$\sin(2\theta) = 2\sin\theta\cos\theta$ $\quad \tan(2\theta) = \frac{2\tan\theta}{1 - \tan^2\theta}$

Half angle Formulas:

$\sin\frac{\alpha}{2} = \pm\sqrt{\frac{1 - \cos\alpha}{2}}$ $\quad \cos\frac{\alpha}{2} = \pm\sqrt{\frac{1 + \cos\alpha}{2}}$ $\quad \tan\frac{\alpha}{2} = \frac{1 - \cos\alpha}{\sin\alpha} = \frac{\sin\alpha}{1 + \cos\alpha}$

Law of sine: $\frac{\sin A}{a} = \frac{\sin B}{b} = \frac{\sin C}{c}$

Law of cosine: $a^2 = b^2 + c^2 - 2bc\cos A$, $b^2 = a^2 + c^2 - 2ac\cos B$, $c^2 = a^2 + b^2 - 2ab\cos C$

Area: $K = \frac{1}{2}bc\sin A$, $K = \frac{1}{2}ac\sin B$, $K = \frac{1}{2}ab\sin C$

Heron's Formula: $K = \sqrt{s(s-a)(s-b)(s-c)}$, where $s = \frac{1}{2}(a + b + c)$