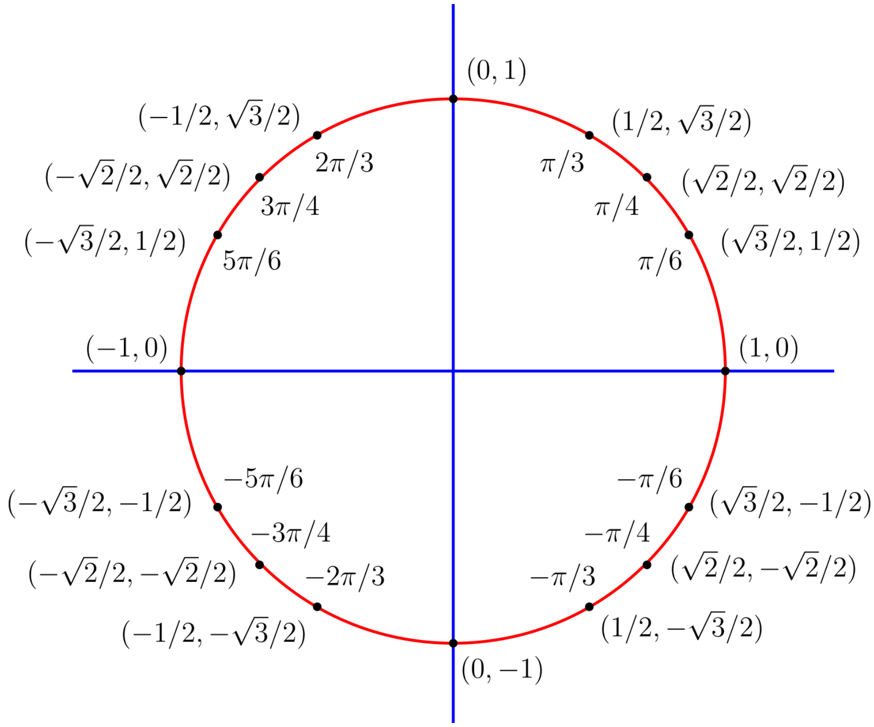
Unit Circle



Exponents

$a^{p/q} = (\sqrt[q]{a})^p = \sqrt[q]{a^p}$	$a^0 = 1$	$a^{-1} = 1/a$
$a^{x+y} = a^x a^y$	$a^{x-y} = a^x a^{-y}$	$(a^b)^c = a^{bc}$

Logs

$$a^b = c \Leftrightarrow log_a(c) = b$$

$\log_a(1) = 0$	$\log_a(a) = 1$	$\log_a(1/a) = -1$
$\log_a(bc) = \log_a(b) + \log_a(c)$	$\log_a(b/c) = \log_a(b) - \log_a(c)$	$\log_a(b^c) = c\log_a(b)$

Value Theorems

- Intermediate Value Theorem: If f is continuous on $[a, b]$, and N is any number between $f(a)$ and $f(b)$, then there is a c in $[a, b]$ such that $f(c) = N$.
- Extreme Value Theorem: If f is continuous on $[a, b]$, then f attains an absolute maximum and an absolute minimum on $[a, b]$.
- Mean Value Theorem: If f is continuous on $[a, b]$ and differentiable on (a, b), then there is a c in (a, b) such that

$$f'(c) = \frac{f(b) - f(a)}{b - a}$$

Definitions

- $\lim_{x\to a} f(x) = f(a)$
- $f'(x) = \lim_{h\to 0} \frac{f(x+h) - f(x)}{h}$
- $\int_a^b f(x)\,dx = \lim_{n\to\infty} \frac{b-a}{n} \sum_{i=1}^{n} f\left(a + i \cdot \frac{b-a}{n}\right)$

Abbreviated Tables

Differentiation

f	f'
fg	$f'g + fg'$
$f(g(x))$	$f'(g(x))g'(x)$
$\frac{f}{g}$	$\frac{f'g - fg'}{g^2}$
$f(x)^{g(x)}$	Use log diff.
a^x	$a^x \ln(a)$
$\ln\lvert x\rvert$	$\frac{1}{x}$
$\log_a(x)$	$\frac{1}{x} \cdot \frac{1}{\ln(a)}$
$\sec(x)$	$\sec(x)\tan(x)$
$\csc(x)$	$-\csc(x)\cot(x)$
$\cot(x)$	$-\csc^2(x)$
$\sin^{-1}(x)$	$\frac{1}{\sqrt{1-x^2}}$
$\tan^{-1}(x)$	$\frac{1}{1+x^2}$

Antiderivatives

f	F
x^n	$\frac{1}{n+1}x^{n+1}, n \neq -1$
$1/x$	$\ln\lvert x\rvert$
e^x	e^x
a^x	$\frac{1}{\ln(a)}a^x$
$\cos(x)$	$\sin(x)$
$\sin(x)$	$-\cos(x)$
$\sec^2(x)$	$\tan(x)$
$\sec(x)\tan(x)$	$\sec(x)$
$\csc(x)\cot(x)$	$-\csc(x)$
$\csc^2(x)$	$-\cot(x)$
$\frac{1}{\sqrt{1-x^2}}$	$\sin^{-1}(x)$
$\frac{1}{1+x^2}$	$\tan^{-1}(x)$