Қысқаша көбейту формулалары

$(a+b)^2 = a^2 + 2ab + b^2$
$(a-b)^2 = a^2 - 2ab + b^2$
$a^2 - b^2 = (a-b)(a+b)$
$(a+b)^3 = a^3 + 3a^2b + 3ab^2 + b^3$
$(a+b)^3 = a^3 - 3a^2b + 3ab^2 - b^3$
$(a-b)^3 = a^3 + 3a^2b + 3ab^2 + b^3$
$a^3 + b^3 = (a+b)(a^2 - ab + b^2)$
$a^3 - b^3 = (a-b)(a^2 + ab + b^2)$

Дәрежеге шығару және түбір қасиеттері

$a^0 = 1 \ a \neq 0$
$a^{-n} = \frac{1}{a^n}$
$a^m \cdot a^n = a^{m+n}$
$a^m \cdot a^n = a^{m+n}$
$a^m : a^n = a^{m-n}$
$(a^m)^n = a^{mn}$
$(ab)^n = a^n b^n$
$(\frac{a}{b})^n = \frac{a^n}{b^n}$
$a^{\frac{1}{n}} = \sqrt[n]{a}$
$a^{\frac{m}{n}} = \sqrt[n]{a^m}$

Логарифм қасиеттері

$log_a 1 = 0$
$log_a a = 1$
$a^{log_a x} = x$
$\log_{\boldsymbol{a}}(\mathrm{x}_{\mathbf{1}} \cdot \mathrm{x}_{\mathbf{2}}) = \log_{\boldsymbol{a}}|x_1| + log_a|x_2|$
$log_a \frac{x_1}{x_2} = \log_{\boldsymbol{a}}|x_1| - log_a|x_2|$
$log_a x^p = p log_a x$
$log_{a^q} x = \frac{1}{q} log_a x$
$log_a x = \frac{log_b x}{log_b a}$
$log_{10} x = lgx$
$lnx = log_e x$

Алгебралық прогрессия

$a_n = a_{n-1} + d = a_1 + (n-1)d$
$S_n = \frac{2a_1 + d(n-1)}{2} \cdot n$
$S_n = \frac{a_1 + a_n}{2} \cdot n$
$d = a_{n+1} - a_n$
$a_n = \frac{a_{n-1} + a_{n+1}}{2}$

Геометриялық прогрессия

$b_n = b_1 q^{n-1}$
$q = \frac{b_{n+1}}{b_n}$
$S_n = \frac{b_1(q^n - 1)}{q - 1}$
$b_n = \pm\sqrt{b_{n-1} \cdot b_{n+1}}$

Шексіз кемімелі геом прогрессия

$b_n = b_1 q^{n-1}, \quad |q| < 1$
$S = \frac{b_1}{1-q}$

Туынды

$c' = 0 \ c = const$
$(x^n)' = nx^{n-1}$
$(a^x)' = a^x lna$
$(e^x)' = e^x$
$(log_a x)' = \frac{1}{xlna}$
$(lnx)' = \frac{1}{x}$
$(sinx)' = cosx$
$(cosx)' = -sinx$
$(\sqrt{x})' = \frac{1}{2\sqrt{x}}$
$(tgx)' = \frac{1}{cos^2 x}$
$(ctgx)' = -\frac{1}{sin^2 x}$
$(arcsinx)' = \frac{1}{\sqrt{1-x^2}}$
$(arccosx)' = -\frac{1}{\sqrt{1-x^2}}$
$(arctgx)' = \frac{1}{1+x^2}$
$(arcctgx)' = -\frac{1}{1+x^2}$

Жанама теңдеуі:
$y = f'(x_0)(x - x_0) + f(x_0)$
$f'(x_0) = k = tg\alpha$

Интеграл

$\int 0 \, dx = C$
$\int 1 \cdot dx = x + C$
$\int x^n \, dx = \frac{x^{n+1}}{n+1} + C$
$\int \frac{1}{x} dx = ln|x| + C$
$\int a^x dx = \frac{a^x}{lna} + C$
$\int e^x \, dx = e^x + C$
$\int sinx \, dx = -\cos x + C$
$\int cos\, x \, dx = \sin x + C$
$\int \frac{1}{sin^2 x} dx = -ctgx + C$
$\int \frac{1}{cos^2 x} dx = tgx + C$
$\int \frac{1}{\sqrt{a^2 - x^2}} dx = \arcsin\frac{x}{a} + C$
$\int \frac{-1}{\sqrt{a^2 - x^2}} dx = \arccos\frac{x}{a} + C$
$\int \frac{1}{a^2 + x^2} dx = \frac{1}{a}\mathrm{arctg}\frac{x}{a} + C$

Тригонометриялық формулалар

$sin^2 x + cos^2 x = 1$
$tg\alpha \cdot ctg\alpha = 1$
$tg\alpha = \frac{\sin\alpha}{\cos\alpha}$
$ctg\alpha = \frac{\cos\alpha}{\sin\alpha}$
$sin2\alpha = 2sin\alpha cos\alpha$
$cos2\alpha = cos^2\alpha - sin^2\alpha$
$cos2\alpha = 2cos^2\alpha - 1 = 1 - 2sin^2\alpha$
$tg2\alpha = \frac{2tg\alpha}{1 - tg^2\alpha}$
$sin\alpha cos\alpha = \frac{1}{2} sin2\alpha$
$sin^2\alpha cos^2\alpha = \frac{1}{4} sin^2 2\alpha$
$1 + tg^2\alpha = \frac{1}{cos^2\alpha}$
$1 + ctg^2\alpha = \frac{1}{sin^2\alpha}$
$sin^2\alpha = \frac{1 - cos2\alpha}{2}$
$cos^2\alpha = \frac{1 + cos2\alpha}{2}$
$1 + cos\alpha = 2cos^2\frac{\alpha}{2}$
$1 - cos\alpha = 2sin^2\frac{\alpha}{2}$
$\cos(\alpha \pm \beta) = \cos\alpha cos\beta \mp \sin\alpha \sin\beta$
$\sin(\alpha \pm \beta) = sin\alpha cos\beta \pm cos\alpha sin\beta$
$tg(\alpha \pm \beta) = \frac{tg\alpha \pm tg\beta}{1 \mp tg\alpha tg\beta}$
$ctg(\alpha \pm \beta) = \frac{1 \mp tg\alpha tg\beta}{tg\alpha \pm tg\beta}$
$sin\alpha + sin\beta = 2sin\frac{\alpha+\beta}{2} cos\frac{\alpha-\beta}{2}$
$sin\alpha - sin\beta = 2sin\frac{\alpha-\beta}{2} cos\frac{\alpha+\beta}{2}$
$\cos\alpha + cos\beta = 2cos\frac{\alpha+\beta}{2} cos\frac{\alpha-\beta}{2}$
$cos\alpha - cos\beta = -2sin\frac{\alpha+\beta}{2} sin\frac{\alpha-\beta}{2}$
$sin\alpha \, cos\beta = \frac{1}{2}(\sin(\alpha+\beta) + \sin(\alpha-\beta))$
$sin\alpha \, sin\beta = \frac{1}{2}(\cos(\alpha-\beta) - \cos(\alpha+\beta))$
$cos\alpha \, cos\beta = \frac{1}{2}(\cos(\alpha+\beta) + \cos(\alpha-\beta))$

Квадрат теңдеу

$ax^2 + bx + c = 0$
$D = b^2 - 4ac$
$x_{1,2} = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$
Виет формуласы:
$x_1 + x_2 = -\frac{b}{a}$
$x_1 \cdot x_2 = \frac{c}{a}$
$ax^2 + bx + c = a(x - x_1)(x - x_2)$