

Single variable calculus 5×5 checklist

Geometry:

Types of triangles: right angle, isosceles

Pythagoras theorem $a^2 + b^2 = c^2$

cos-formula $c^2 = a^2 + b^2 - 2ab \cos(\alpha)$

sin-formula $a/\sin(\alpha) = b/\sin(\beta) = c/\sin(\gamma)$

Equations of lines, circles, ellipses, hyperbola

Functions:

Polynomials, notation like x^n , $x^{-3/4}$ $(1+x)^n$

Square roots and higher order roots $\sqrt[n]{x}$

The natural logarithm $\log(x) = \ln(x)$

The exponential function e^x and $a^x = e^{x \log(a)}$

Trig functions: sin, cos, tan and their inverses

Algebra:

Solving linear and quadratic equations

Multiply and factor polynomials

Use exponentials like $e^a e^b = e^{a+b}$, $(e^a)^b = e^{ab}$

Trigonometric identities like $\sin^2(x) + \cos^2(x) = 1$

Identities: $\log(xy) = \log(x) + \log(y)$, $\log(a^b) = b \log(a)$

Derivatives:

Mechanisms for discontinuity

Leibniz rule, quotient and chain rule

Finding extrema using first derivative test

Find critical point using second derivative test

Taylor formula $f(x) = f(0) + f'(0)x + f''(0)x^2/2 + \dots$

Integrals:

Integration by parts

Integration by substitution

Partial fractions

Convergence of $\int_0^1 x^\alpha dx$ or $\int_1^\infty x^\alpha dx$

Fundamental theorem of calculus

$\int_0^x f'(t) dt = f(x) - f(0)$ $(\int_0^x f(t) dt)' = f(x)$