




How it works?

1. **Enter** text and formulas into the "**Code**" box on the left.
2. Click  to **calculate**. The results will appear in the "**Output**" box on the right as a professionally formatted **Html report**.
3. Click  to **print** or  to **copy** the output.

You can also **export** it to **Html** , **PDF**  or **MS Word**  document.

The language

Calcpad language includes the following elements (click an item to insert):

- Real numbers: digits "0" - "9" and decimal point ".";
- Complex numbers: **re** ± **im***i* (e.g. **3** - **2i**);
- Variables:
 - Latin letters: "*a*" - "*z*", "*A*" - "*Z*";
 - Greek letters: "*α*" - "*ω*", "*A*" - "*Ω*";
 - digits: "0" - "9";
 - comma: " , ";
 - prime symbols: " ' ", " '' ", " ''' ", " '''' ";
 - special symbols: " ∅ ", " ∅ ", " ° ", " 4 ";
 - "_" for subscript;

A variable name must start with a letter. Names are case sensitive.

- Operators:
 - "!" - factorial;
 - "^" - exponent;
 - "/" - division;
 - "÷" - force division bar;
 - "\" - division;
 - "%" - reminder;
 - "*" - multiplication;
 - "-" - minus;
 - "+" - plus;
 - "≡" - equal to;
 - "≠" - not equal to;
 - "<" - less than;
 - ">" - greater than;
 - "≤" - less or equal;

" \geq " - greater or equal;

"=" - assignment;

- Custom functions of type $f(x; y; z; \dots)$;

- Built-in functions:

abs(x) - absolute value/magnitude;

sin(x) - sine;

cos(x) - cosine;

tan(x) - tangent;

csc(x) - cosecant;

sec(x) - secant;

cot(x) - cotangent;

sinh(x) - hyperbolic sine;

cosh(x) - hyperbolic cosine;

tanh(x) - hyperbolic tangent;

csch(x) - hyperbolic cosecant;

sech(x) - hyperbolic secant;

coth(x) - hyperbolic cotangent;

asin(x) - inverse sine;

acos(x) - inverse cosine;

atan(x) - inverse tangent;

atan2($x; y$) - the angle whose tangent is the quotient of y and x ;

acsc(x) - inverse cosecant;

asec(x) - inverse secant;

acot(x) - inverse cotangent;

asinh(x) - inverse hyperbolic sine;

acosh(x) - inverse hyperbolic cosine;

atanh(x) - inverse hyperbolic tangent;

acsch(x) - inverse hyperbolic cosecant;

asech(x) - inverse hyperbolic secant;

acoth(x) - inverse hyperbolic cotangent;

log(x) - decimal logarithm;

ln(x) - natural logarithm;

log₂(x) - binary logarithm;

sqr(x) or **sqrt**(x) - square root;

cbrt(x) - cubic root;

root($x; n$) - n -th root;

round(x) - round to the nearest integer;

floor(x) - round to the lower integer;

- ceiling**(x) - round to the greater integer;
- trunc**(x) - round to the nearest integer towards zero;
- re**(x) - the real part of a complex number;
- im**(x) - the imaginary part of a complex number;
- phase**(x) - the phase of a complex number;
- random**(x) - random number between 0 and x ;
- min**(x ; y ; $z...$) - minimum of multiple values;
- max**(x ; y ; $z...$) - maximum of multiple values;
- sum**(x ; y ; $z...$) - sum of multiple values = $x + y + z...$;
- sumsq**(x ; y ; $z...$) - sum of squares = $x^2 + y^2 + z^2...$;
- srss**(x ; y ; $z...$) - square root of sum of squares = **sqrt**($x^2 + y^2 + z^2...$);
- average**(x ; y ; $z...$) - average of multiple values = $(x + y + z...)/n$;
- product**(x ; y ; $z...$) - product of multiple values = $x \cdot y \cdot z...$;
- mean**(x ; y ; $z...$) - geometric mean = **n-th root**($x \cdot y \cdot z...$);
- if**($\langle cond \rangle$; $\langle value-if-true \rangle$; $\langle value-if-false \rangle$) - conditional evaluation;
- switch**($\langle cond1 \rangle$; $\langle value1 \rangle$; $\langle cond2 \rangle$; $\langle value2 \rangle$; ... ; $\langle default \rangle$) - selective evaluation;
- take**(n ; a ; b ; $c...$) - returns the n -th element from the list;
- line**(x ; a ; b ; $c...$) - linear interpolation;
- spline**(x ; a ; b ; $c...$) - Hermite spline interpolation;
- Comments: "Title" or 'text' in double or single quotes, respectively. **HTML**, **CSS**, **JS** and **SVG** are allowed.
- Graphing and plotting:
 - \$Plot** { $f(x)$ @ $x = a : b$ } - simple plot;
 - \$Plot** { $x(t)$ | $y(t)$ @ $t = a : b$ } - parametric;
 - \$Plot** { $f_1(x)$ & $f_2(x)$ & ... @ $x = a : b$ } - multiple;
 - \$Plot** { $x_1(t)$ | $y_1(t)$ & $x_2(t)$ | $y_2(t)$ & ... @ $x = a : b$ } - multiple parametric;
 - \$Map** { $f(x; y)$ @ $x = a : b$ & $y = c : d$ } - 2D color map of a 3D surface;
 - PlotHeight** - height of plot area in pixels;
 - PlotWidth** - width of plot area in pixels;
- Iterative and numerical methods:
 - \$Root** { $f(x) = \text{const}$ @ $x = a : b$ } - root finding for $f(x) = \text{const}$;
 - \$Root** { $f(x)$ @ $x = a : b$ } - root finding for $f(x) = 0$;
 - \$Find** { $f(x)$ @ $x = a : b$ } similar to above, but x is not required to be a precise solution;
 - \$Sup** { $f(x)$ @ $x = a : b$ } - local maximum of a function;
 - \$Inf** { $f(x)$ @ $x = a : b$ } - local minimum of a function;
 - \$Area** { $f(x)$ @ $x = a : b$ } - numerical integration;
 - \$Slope** { $f(x)$ @ $x = a$ } - numerical differentiation;

$\$Sum \{ f(k) @ k = a : b \}$ - iterative sum;

$\$Product \{ f(k) @ k = a : b \}$ - iterative product;

$\$Repeat \{ f(k) @ k = a : b \}$ - general inline iterative procedure;

Precision - relative precision for numerical methods [10^{-2} ; 10^{-16}] (default is 10^{-12})

- Program flow control:

Simple:

```
#if <condition>
  <Your code goes here>
#end if
```

Alternative:

```
#if <condition>
  <Your code goes here>
#else
  <Some other code>
#end if
```

Complete:

```
#if <condition1>
  <Your code goes here>
#else if <condition2>
  <Your code goes here>
#else
  <Some other code>
#end if
```

You can add or omit as many "#else if's" as needed. Only one "#else" is allowed. You can omit this too.

- Iteration blocks:

Simple:

```
#repeat <number of repetitions>
  <Your code goes here>
#loop
```

With conditional break:

```
#repeat <number of repetitions>
  <Your code goes here>
  #if <condition>
    #break
  #end if
  <Some more code>
#loop
```

- Output control:

#hide - hide the report contents;

#show - always show the contents (default);

#pre - show the next contents only before calculations;

#post - show the next contents only after calculations;

#val - show only the final result, without the equation;

#equ - show complete equations and results (default);

Each of the above commands is effective after the current line until the end of the report or another command that overwrites it.

- Units for trigonometric functions: **#deg** - degrees, **#rad** - radians;

- Separator for target units: **|**;

- Metric units (SI and compatible):

Mass: *g, hg, kg, t, kt, Mt, Gt, dg, cg, mg, μ g, Da, u*;

Length: *m, km, dm, cm, mm, μ m, nm, pm, AU, ly*;

Time: *s, ms, μ s, ns, ps, min, h, d*;

Frequency: *Hz, kHz, MHz, GHz, THz, mHz, μ Hz, nHz, pHz, rpm*;

Velocity: *kmh*;

Electric current: *A, kA, MA, GA, TA, mA, μ A, nA, pA*;

Temperature: *°C, Δ °C, K*;

Amount of substance: *mol*;

Luminous intensity: *cd*;

Area: *a, daa, ha*;

Volume: *L, mL, cL, dL, hL*;

Force: *dyn N, daN, hN, kN, MN, GN, TN, kgf, tf*;

Moment: *Nm, kNm*;

Pressure: *Pa, daPa, hPa, kPa, MPa, GPa, TPa, dPa, cPa, mPa, μ Pa, nPa, pPa, bar, mbar, μ bar, atm, at, Torr, mmHg*;

Energy work: *J, kJ, MJ, GJ, TJ, mJ, μ J, nJ, pJ, Wh, kWh, MWh, GWh, TWh, cal, kcal, erg, eV, keV, MeV, GeV, TeV, PeV, EeV*;

Power: *W, kW, MW, GW, TW, mW, μ W, nW, pW, hpM, ks*;

Electric charge: *C, kC, MC, GC, TC, mC, μ C, nC, pC, Ah, mAh*;

Potential: *V, kV, MV, GV, TV, mV, μ V, nV, pV*;

Capacitance: *F, kF, MF, GF, TF, mF, μ F, nF, pF*;

Resistance: *Ω , k Ω , M Ω , G Ω , T Ω , m Ω , $\mu\Omega$, n Ω , p Ω* ;

Conductance: *S, kS, MS, GS, TS, mS, μ S, nS, pS*;

Magnetic flux: *Wb, kWb, MWb, GWb, TWb, mWb, μ Wb, nWb, pWb*;

Magnetic flux density: *T, kT, MT, GT, TT, mT, μ T, nT, pT*;

Inductance: *H, kH, MH, GH, TH, mH, μ H, nH, pH*;

Luminous flux: *lm*;

Illuminance: *lx*;

Radioactivity: *Bq, kBq, MBq, GBq, TBq, mBq, μBq, nBq, pBq, Ci, Rd*;

Absorbed dose: *Gy, kGy, MGy, GGy, TGy, mGy, μGy, nGy, pGy*;

Equivalent dose: *Sv, kSv, MSv, GSv, TSv, mSv, μSv, nSv, pSv*;

Catalytic activity: *kat*;

- Non-metric units (Imperial/US):

Mass: *gr, dr, oz, lb, kip, st, qr, cwt, cwt_{UK}, cwt_{US}, ton, ton_{UK}, ton_{US}, slug*;

Length: *th, in, ft, yd, ch, fur, mi, ftm, cable, nmi, li, rod, pole, perch, lea*;

Speed: *mph*;

Temperature: *°F, Δ°F, °R*;

Area: *rood, ac*;

Volume (fluid): *fl_oz, gi, pt, qt, gal, bbl*, (dry) *bu*;

fl_oz_{UK}, gi_{UK}, pt_{UK}, qt_{UK}, gal_{UK}, bbl_{UK}, (dry) *bu_{UK}*;

fl_oz_{US}, gi_{US}, pt_{US}, qt_{US}, gal_{US}, bbl_{US}, (dry) *bu_{US}*;

Force: *ozf, lbf, kipf, tonf, pdl*;

Pressure: *osi, osf psi, psf, ksi, ksf, tsi, tsf, inHg*;

Energy/work: *BTU, therm, therm_{UK}, therm_{US}, quad*;

Power: *hp, hpE, hpS*.