**Calculator Manual**

**Basic Functions**

**Quit Application:**

Function used to exit the calculator application.

To use this function type ‘**quit**’.

This can be lower-case or upper-case letters. (No blank spaces or other characters are allowed before or after).

|  |  |
| --- | --- |
| Example input:   * quit * QUIT * Quit | Invalid input:   * q * quit. * quit 1 |

**Reset:**

Function used to reset result of previous calculation to zero.

To use this function type ‘**ac**’.

This can be lower-case or upper-case letters. (No blank spaces or other characters are allowed before or after).

|  |  |
| --- | --- |
| Example input:   * ac * AC * Ac | Invalid Input:   * ac 1 * ac. * a |

**Input Format**

For each function there must be **one space between each number and operator**.

|  |  |
| --- | --- |
| Example input:   * 1 + 2 * 2 – 1 * 2 \* 2 * 10 / 2 * 3 ^ 2 * root 9 * 5 ! * inv 5 * sin 90 * cos 180 | Invalid input:   * 1+2 * 2–1 * 2\*2 * 10/2 * 3^2 * root9 * 5! * inv5 * sin90 * cos180 |

**Fractions**

The calculator **does not accept fractions** as an input. To use fractions in a calculation first use the divide function to work out the fraction as a decimal and then use the previous result ‘res’ in the next calculation.

For example, when adding 4 and 1/3, the first calculation is ‘1 / 3’, and the second is ‘res + 4’.

**Angle Mode**

The calculator **only uses degrees** as an input for the sin and cos functions. To work out sin or cos of radians first convert them to degrees using the multiply and divide functions, and then use the previous result ‘res’ in the sin or cos function.

Radians to degree conversion is: θ \* 180/π (where θ is the angle in radians)

For example, for sin(2.5C), the first calculation is ‘2.5 \* 180’, the second is ‘res / pi’, and the third is ‘sin res’.

**Special Numbers**

**PI (π):**

To use pi (π) in a calculation type ‘**pi**’ with the function you want to use, in the correct format below.

(‘pi’ cannot be used in the factorial function as this only takes integer number inputs).

|  |  |
| --- | --- |
| Example input:   * pi + 10 * 20 - pi * 2 \* pi * 180 / pi * pi ^ 2 * root pi * inv pi * sin pi * cos pi | Invalid input:   * pi ! |

**e:**

To use e in a calculation type ‘**e**’ with the function you want to use, in the correct format below.

(‘e’ cannot be used in the factorial function as this only takes integer number inputs).

|  |  |
| --- | --- |
| Example input:   * 5.8 + e * e - 1 * 3 \* e * 100 / e * e ^ 4 * root e * inv e * sin e * cos e | Invalid input:   * e ! |

**Previous Result:**

To use the result of the previous calculation in the next one type ‘**res**’ with the function you want to use, in the correct format below.

(If ‘res’ is a decimal or negative number it cannot be used in the factorial function as this only takes positive integer number inputs, if ‘res’ is zero it cannot be used as the second input for the division function, if ‘res’ is negative it cannot be used in the root function as this only takes positive number inputs).

|  |  |  |
| --- | --- | --- |
| Example input:   * res + 9 * 2.5 - res * 1.9 \* res * res / 2 * res ^ 3 * root res * res ! * inv res * sin res * cos res | Invalid input:   * res ! * 1 / res * root res | (when ‘res’ < 1 or ‘res’ is not an integer number)  (when ‘res’ == 0)  (when ‘res’ < 0) |

**Maths Functions**

**Add:**

Function used to add two numbers together.

To use this function, type the calculation in the form ‘**x + y**’ where x and y can be **integer numbers**, **decimal numbers**, ‘**e**’, ‘**pi**’, or ‘**res**’.

**There must be a space between each part of the calculation** (a space between x and +, and a space between + and y). (No blank spaces or other characters are allowed before or after).

No fractions are allowed, to do a calculation with fractions first use the divide function to work out the fraction as a decimal and then use the previous result ‘**res**’ in the add function.

|  |  |
| --- | --- |
| Example input:   * 5 + 10 * 2.5 + 6.7 * 5 + 2.5 * e + 6 * pi + 3 * res + 1.8 * e + pi * pi + res * res + e | Invalid input:   * 5+10 * 2.5+6.7 * 5+2.5 * e+6 * pi+3 * res+1.8 * e+pi * pi+res * res+e * 2 + 1/3 |

**Subtract:**

Function used to subtract the second number from the first number.

To use this function, type the calculation in the form ‘**x - y**’ where x and y can be **integer numbers**, **decimal numbers**, ‘**e**’, ‘**pi**’, or ‘**res**’.

**There must be a space between each part of the calculation** (a space between x and -, and a space between - and y). (No blank spaces or other characters are allowed before or after).

No fractions are allowed, to do a calculation with fractions first use the divide function to work out the fraction as a decimal and then use the previous result ‘**res**’ in the subtract function.

|  |  |
| --- | --- |
| Example input:   * 5 - 10 * 2.5 - 6.7 * 5 - 2.5 * e - 6 * pi - 3 * res - 1.8 * e - pi * pi - res * res - e | Invalid input:   * 5-10 * 2.5-6.7 * 5-2.5 * e-6 * pi-3 * res-1.8 * e-pi * pi-res * res-e * 2 - 1/3 |

**Multiply:**

Function used to multiply two numbers together.

To use this function, type the calculation in the form ‘**x \* y**’ where x and y can be **integer numbers**, **decimal numbers**, ‘**e**’, ‘**pi**’, or ‘**res**’.

**There must be a space between each part of the calculation** (a space between x and \*, and a space between \* and y). (No blank spaces or other characters are allowed before or after).

No fractions are allowed, to do a calculation with fractions first use the divide function to work out the fraction as a decimal and then use the previous result ‘**res**’ in the multiply function.

|  |  |
| --- | --- |
| Example input:   * 5 \* 10 * 2.5 \* 6.7 * 5 \* 2.5 * e \* 6 * pi \* 3 * res \* 1.8 * e \* pi * pi \* res * res \* e | Invalid input:   * 5\*10 * 2.5\*6.7 * 5\*2.5 * e\*6 * pi\*3 * res\*1.8 * e\*pi * pi\*res * res\*e * 2 \* 1/3 |

**Divide:**

Function used to divide the first number by the second number.

To use this function, type the calculation in the form ‘**x / y**’ where x and y can be **integer numbers**, **decimal numbers**, ‘**e**’, ‘**pi**’, or ‘**res**’. (**y cannot be zero**).

**There must be a space between each part of the calculation** (a space between x and /, and a space between / and y). (No blank spaces or other characters are allowed before or after).

|  |  |  |
| --- | --- | --- |
| Example input:   * 5 / 10 * 2.5 / 6.7 * 5 / 2.5 * e / 6 * pi / 3 * res / 1.8 * e / pi * pi / res * res / e | Invalid input:   * 5/10 * 2.5/6.7 * 5/2.5 * e/6 * pi/3 * res/1.8 * e/pi * pi/res * res/e * 5 / 0 * 2 / res | (when ‘res’ == 0) |

**Raise to Power:**

Function used to raise the first number to the power of the second number (xy).

To use this function, type the calculation in the form ‘**x ^ y**’ where x and y can be **integer numbers**, **decimal numbers**, ‘**e**’, ‘**pi**’, or ‘**res**’.

**There must be a space between each part of the calculation** (a space between x and ^, and a space between ^ and y). (No blank spaces or other characters are allowed before or after).

No fractions are allowed, to do a calculation with fractions first use the divide function to work out the fraction as a decimal and then use the previous result ‘**res**’ in the power function.

|  |  |
| --- | --- |
| Example input:   * 5 ^ 2 * 2.5 ^ 0.5 * 5 ^ 0.5 * e ^ 4 * pi ^ 3 * res ^ 1.8 * e ^ pi * pi ^ res * res ^ e | Invalid input:   * 5^2 * 2.5^0.5 * 5^0.5 * e^4 * pi^3 * res^1.8 * e^pi * pi^res * res^e * 2 ^ 1/3 |

**Square Root:**

Function used to find the square root of a number (√x).

To use this function, type the calculation in the form ‘**sqrt x**’ where x can be **an integer number**, **decimal number**, ‘**e**’, ‘**pi**’, or ‘**res**’. (**x cannot be a negative number**)

**There must be a space between each part of the calculation** (a space between root and x). (No blank spaces or other characters are allowed before or after).

No fractions are allowed, to do a calculation with fractions first use the divide function to work out the fraction as a decimal and then use the previous result ‘**res**’ in the power function.

|  |  |  |
| --- | --- | --- |
| Example input:   * sqrt 4 * sqrt 8.5 * sqrt e * sqrt pi * sqrt res | Invalid input:   * sqrt4 * sqrt8.5 * sqrte * sqrtpi * sqrtres * sqrt -4 * sqrt res | (when ‘res’ < 0) |

**Cube Root:**

Function used to find the cube root of a number (3√x).

To use this function, type the calculation in the form ‘**cbrt x**’ where x can be **an integer number**, **decimal number**, ‘**e**’, ‘**pi**’, or ‘**res**’.

**There must be a space between each part of the calculation** (a space between root and x). (No blank spaces or other characters are allowed before or after).

No fractions are allowed, to do a calculation with fractions first use the divide function to work out the fraction as a decimal and then use the previous result ‘**res**’ in the power function.

|  |  |  |
| --- | --- | --- |
| Example input:   * cbrt 4 * cbrt 8.5 * cbrt e * cbrt pi * cbrt res * cbrt -4 | Invalid input:   * cbrt4 * cbrt8.5 * cbrte * cbrtpi * cbrtres * cbrt res | (when ‘res’ < 0) |

**Factorial:**

Function used to find the factorial of an integer number.

To use this function, type the calculation in the form ‘**x !**’ where x can be **needs to be a positive integer number**. (**res can be used if it is a positive integer**)

**There must be a space between each part of the calculation** (a space between x and !). (No blank spaces or other characters are allowed before or after).

|  |  |  |
| --- | --- | --- |
| Example input:   * 5 ! * 3 ! * res ! | Invalid input:   * 5! * 3! * res! * res ! | (when ‘res’ < 1 or ‘res’ is not an integer number) |

**Inverse:**

Function used to find the inverse of a number (1/x).

To use this function, type the calculation in the form ‘**inv x**’ where x can be **an** **integer number**, **decimal number**, ‘**e**’, ‘**pi**’, or ‘**res**’. (**x cannot be zero**).

**There must be a space between each part of the calculation** (a space between inv and x). (No blank spaces or other characters are allowed before or after).

No fractions are allowed, to do a calculation with fractions first use the divide function to work out the fraction as a decimal and then use the previous result ‘**res**’ in the power function.

|  |  |  |
| --- | --- | --- |
| Example input:   * inv 5 * inv 9.8 * inv e * inv pi * inv res | Invalid Input:   * inv5 * inv9.8 * inve * invpi * invres * inv 0 * inv res | (when ‘res’ == 0) |

**Sin:**

Function used to find the sin of an angle.

To use this function, type the calculation in the form ‘**sin x**’ where x can be **an** **integer number**, **decimal number**, ‘**e**’, ‘**pi**’, or ‘**res**’.

**There must be a space between each part of the calculation** (a space between sin and x). (No blank spaces or other characters are allowed before or after).

No fractions are allowed, to do a calculation with fractions first use the divide function to work out the fraction as a decimal and then use the previous result ‘**res**’ in the power function.

The sin function **only uses degrees** as an input. To work out sin of radians first convert them to degrees using the multiply and divide functions, and then use the previous result ‘res’ in the sin function.

Radians to degree conversion is: θ \* 180/π (where θ is the angle in radians)

|  |  |
| --- | --- |
| Example input:   * sin 0 * sin 90 * sin 26.5 * sin e * sin pi * sin res | Invalid input:   * sin0 * sin90 * sin26.5 * sine * sinpi * sinres |

**Cos:**

Function used to find the cos of an angle.

To use this function, type the calculation in the form ‘**cos x**’ where x can be **an** **integer number**, **decimal number**, ‘**e**’, ‘**pi**’, or ‘**res**’.

**There must be a space between each part of the calculation** (a space between cos and x). (No blank spaces or other characters are allowed before or after).

No fractions are allowed, to do a calculation with fractions first use the divide function to work out the fraction as a decimal and then use the previous result ‘**res**’ in the power function.

The sin function **only uses degrees** as an input. To work out cos of radians first convert them to degrees using the multiply and divide functions, and then use the previous result ‘res’ in the cos function.

Radians to degree conversion is: θ \* 180/π (where θ is the angle in radians)

|  |  |
| --- | --- |
| Example input:   * cos 0 * cos 90 * cos 26.5 * cos e * cos pi * cos res | Invalid input:   * cos0 * cos90 * cos26.5 * cose * cospi * cosres |

**Errors**

“Error: Invalid operation or number input”

This error means that you did not enter a calculation or function in the correct format.

"Error: Invalid number input"

This error means you did not enter a valid number into a calculation.

"Math Error: Negative root"

This error means you tried to square root a negative number.

"Math Error: Non-Integer or Negative Factorial"

This error means you tried to do a factorial of a decimal or a negative number.

"Math Error: Zero Division"

This error means you tried to divide by zero.