## Complex numbers

$w = \pm\sqrt[n]{z}$

Example : Solve for z. z = complex

$n := 2$

$x := 1$

$y := 1$

Example values for x, y, and for the n-th root. x, y, and n = integers. Express z by $z = x + i \cdot y$

$$w^n = x + i \cdot y \;\Big|\; \begin{matrix}\text{solve}, w \\ \text{float}, 3\end{matrix} \rightarrow \begin{pmatrix} 1.1 + 0.455i \\ -1.1 - 0.455i \end{pmatrix}$$

**OK**

$x := 1$

$y := 1.1$

Example values for x, y. In this example y is a floating number. You can also choose x as a floating number, or both.

$$w^n = x + i \cdot y \;\Big|\; \begin{matrix}\text{solve}, w \\ \text{float}, 3\end{matrix} \rightarrow \begin{pmatrix} -1.0 \\ 1.0 \end{pmatrix}$$

**NOK**

As long as x and /or y are integers the results are correct. This is valid for $n \geq 2$. I've not verified it for n = real, in general.
**Does Mathcad 15 have any Problems when solving for complex numbers ?**

$n := n$ Reset for sure

## Limits

$$a(n) := \frac{n^n}{n!}$$

Coefficients formula as an example

$$q(n) := \frac{a(n)}{a(n+1)} \rightarrow \left(\frac{n}{n+1}\right)^n$$

**Using the ratio test.**

$$\lim_{n \to \infty} |q(n)| \rightarrow e^{-1}$$

**OK**

$$\lim_{n \to \infty} \left|\sqrt[n]{a(n)}\right| \rightarrow \lim_{n \to \infty} \left|\sqrt[n]{\frac{n^n}{n!}}\right|$$

**???**
**Using the Cauchy-Hadamard formula.**

$$\lim_{n \to \infty} (a(n))^{\frac{1}{n}} \rightarrow e$$

**But this works.**

As long as the root sign together with the limit operator isn't used the calculation of the limit is correct.
**Does Mathcad 15 have any problems with the limit and/or the root functions ?**