n-th roots of complex numbers

Let $z = r(\cos(\theta) + i\sin(\theta)$ be a complex number and $n \in \mathbb{N}$.

We call

$$z_1 = \sqrt[n]{r}\left(\cos\left(\frac{\theta}{n}\right) + i\sin\left(\frac{\theta}{n}\right)\right)$$

the *principal nth root of z*.

Examples:

$z = i = 1(\cos(\frac{\pi}{2}) + i\sin(\frac{\pi}{2}))$ the principal nth root
is $\cos(\frac{\pi}{2n}) + i(\frac{\pi}{2n})$
$z = 0$ the principal n-th root is 0.

For $z \neq 0$ there are n distinct nth roots which can be computed via

$$\begin{aligned}
z_1 &= \sqrt[n]{r}\left(\cos\left(\frac{\theta}{n}\right) + i\sin\left(\frac{\theta}{n}\right)\right)\\
z_2 &= \sqrt[n]{r}\left(\cos\left(\frac{\theta+2\pi}{n}\right) + i\sin\left(\frac{\theta+2\pi}{n}\right)\right)\\
z_3 &= \sqrt[n]{r}\left(\cos\left(\frac{\theta+4\pi}{n}\right) + i\sin\left(\frac{\theta+4\pi}{n}\right)\right)\\
\vdots &\quad \vdots\\
z_n &= \sqrt[n]{r}\left(\cos\left(\frac{\theta+2(n-1)\pi}{n}\right) + i\sin\left(\frac{\theta+2(n-1)\pi}{n}\right)\right)
\end{aligned}$$