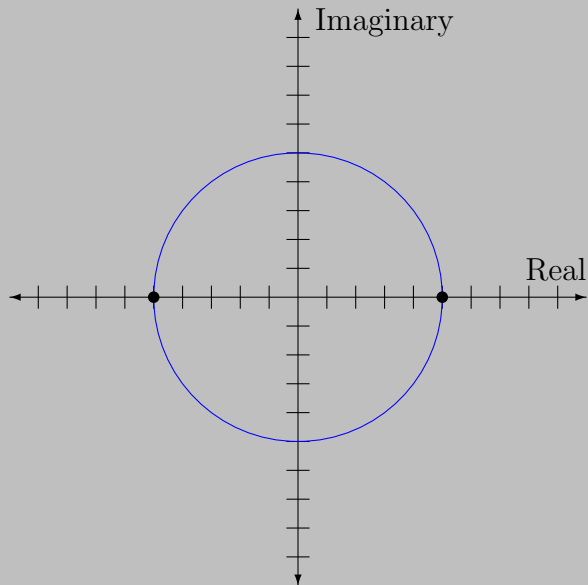


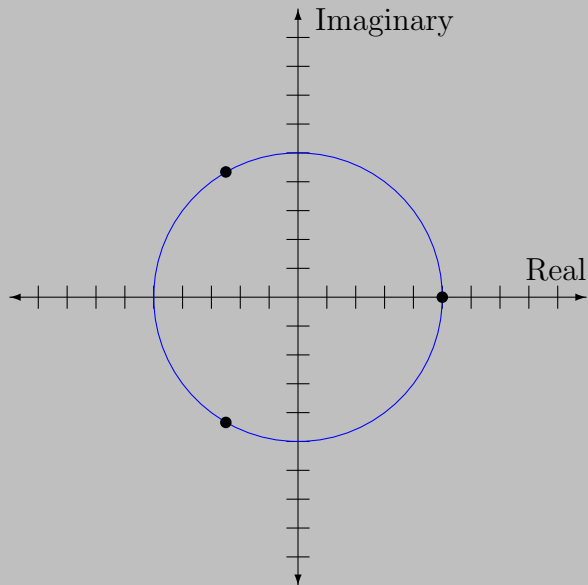
Complex Unit Circle

Polar coordinates

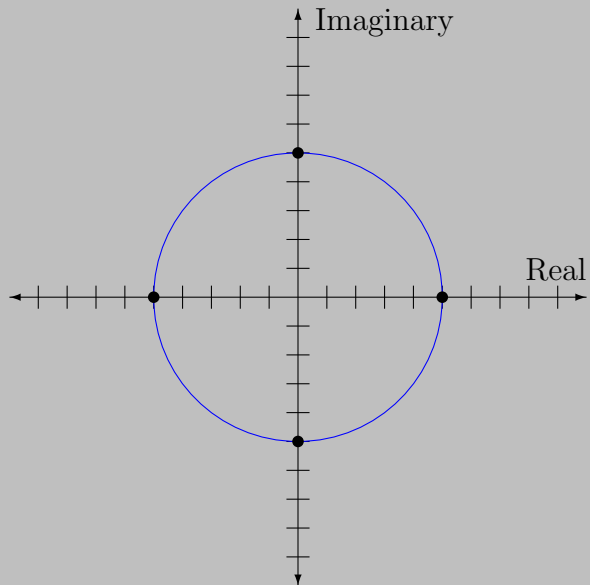
$x^2 = 1$ has two solutions: $x \in \{\pm 1\}$.



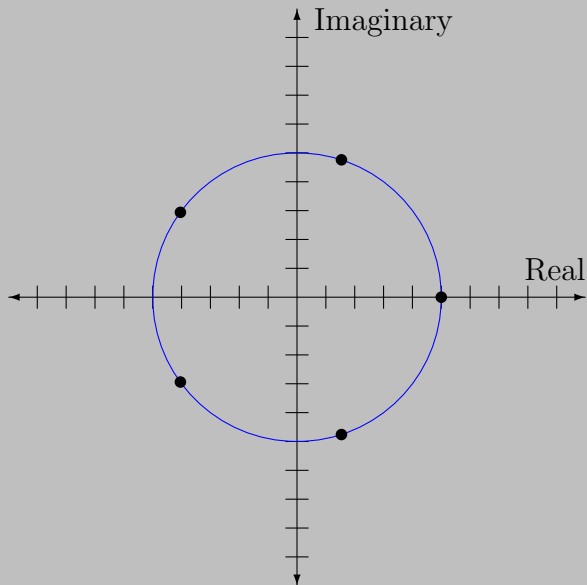
$x^3 = 1$ has three solutions: $x \in \{1, -0.5 \pm 0.866i\}$.



$x^4 = 1$ has four solutions: $x \in \{\pm 1, \pm i\}$.



$x^5 = 1$ has five solutions: $x \in \{1, 0.309 \pm 0.951i, -0.809 \pm 0.588i\}$.



$$e^{ix} = \cos(x) + i \sin(x)$$

therefore

$$e^{2\pi i} = 1$$

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Raising both sides to the k^{th} power we get

$$e^{(2\pi i)k} = 1^k = 1 \quad \text{for } k = 0, 1, 2, 3, \dots$$

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$x^n = 1$ has the solution

$$x = e^{(2\pi i)k/n} \quad \text{for } k = 0, 1, 2, 3, \dots$$

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$x^n = 1$ has the solution

$$x = e^{(2\pi i)k/n} \quad \text{for } k = 0, 1, 2, 3, \dots$$

$$e^{(2\pi i)0/3} = 1$$

$$e^{(2\pi i)1/3} = -0.5 + 0.866i$$

$$e^{(2\pi i)2/3} = -0.5 - 0.866i$$

The [MODE] menu has the option to represent complex numbers in the form $x = re^{\theta i}$ where r is the radius (complex absolute value) and θ is the angle.

Alternatively, the [MATH][CPX][\rightarrow Rect] and [\rightarrow Polar] menu items can be used.

```
Normal Sci Eng
Float 0123456789
Radian Degree
Func Par Pol Seq
Connected Dot
Sequential Simul
Real a+bi re^θi
Full Horiz G-T
```

```
3+4i
5.000e^(.927i)
√(3+4i)
2.236e^(.464i)
Ans▶Rect
2.000+i
```