Exercise 28

For the following exercises, solve the equations over the complex numbers.

$$x^2 + 36 = 0$$

Solution

Isolate the term with the variable by subtracting 36 from both sides.

$$x^2 = -36$$

Take the square root of both sides.

$$\begin{aligned}\sqrt{x^2} &= \sqrt{-36} \\ &= \sqrt{36(-1)} \\ &= \sqrt{36}\sqrt{-1} \\ &= 6i\end{aligned}$$

Since there's an even power under an even root, and the result is to an odd power, an absolute value sign is needed around x.

$$|x| = 6i$$

Remove the absolute value sign by placing $\pm$ on the right side.

$$x = \pm 6i$$

Therefore, $x = \{-6i, 6i\}$.