2.4 Complex Numbers and Operations

Solve

$$\sqrt{x^2} = \sqrt{16}$$

$$X = \pm 4$$
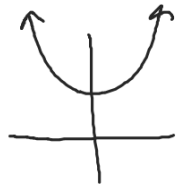
↑

x-intercept

$$\sqrt{x^2} = \sqrt{-9} \longrightarrow \text{Not Real} \quad \#$$

$$\longrightarrow \text{Immaginary} \quad \#$$

$$\sqrt{-9} = \sqrt{-1} \cdot \sqrt{9} \qquad \sqrt{-1} = i$$

$$= i \cdot \pm 3$$

$$X = \pm 3i$$

$$\sqrt{x^2} = \sqrt{-7}$$

$$x = \sqrt{7} \cdot \sqrt{-1}$$

$$\pm \sqrt{7}\, i$$

$$\pm i\sqrt{7}$$

$$\sqrt{x^2} = \sqrt{-25}$$

$$x = \sqrt{25} \cdot \sqrt{-1}$$

$$= \pm 5i$$

2.4

14-17

$$\sqrt{x^2} = \sqrt{-72}$$

$$x = \sqrt{72} \cdot \sqrt{-1}$$

$$\sqrt{36} \quad \sqrt{2}$$

$$\pm 6\sqrt{2}\, i$$

$$\pm 6 i \sqrt{2}$$

$$1^2 = 1$$
$$2^2 = 4$$
$$3^2 = 9$$
$$4^2 = 16$$
$$5^2 = 25$$
$$6^2 = 36$$
$$7^2 = 49$$
$$8^2 = 64$$
$$9^2 = 81$$
$$10^2 = 100$$

14) $\sqrt{x^2} = \sqrt{5}$

$x = \pm i\sqrt{5}$

16) $\sqrt{x^2} = \sqrt{18}$

$x = \sqrt{18} \cdot \sqrt{-1}$

$\overset{\wedge}{\sqrt{9} \cdot \sqrt{2}}$

$= \pm 3i\sqrt{2}$

$\pm 3\sqrt{2}i$

15) $x^2 = -0.01$

$\sqrt{0.01} = \sqrt{\frac{1}{100}} = \frac{1}{10}$

$= \pm \frac{1}{10}i$

$= \pm 0.1i$

17) $x^2 = (-1)^2$

$\sqrt{x^2} = \sqrt{1}$

$x = \pm 1$

Find the Sum

$a + bi \rightarrow$ Standard Form

$(\underline{-4} + \underline{6i}) + (\underline{-2} - \underline{9i})$
real   Imag   real   Imm

$(3 - 2i) - (-4 - i)$

$-\underline{6} - \underline{3i}$
real   Immaginary

$3 - 2i + 4 + i$

$7 - i$

Complex #

Write in standard form (a+bi)

$2i(8 - 9i)$

$(i)^2 = (\sqrt{-1})^2$

$i^2 = -1$

$(5 - 3i)(1 + 2i)$

$2i(8) - 2i(9i)$

$16i - 18i^2$

$16i - 18(-1)$

$16i + 18$

$18 + 16i$

$5 + 10i - 3i - 6i^2$

$5 + 7i - 6i^2$

$5 + 7i - 6(-i)$

$5 + 7i + 6$

$11 + 7i$

$$\frac{5}{(2-6i)} \frac{(2+6i)}{(2+6i)}$$

Conjugate

| $a+bi$ | $a-bi$ |
| $a-bi$ | $a+bi$ |

$$\frac{10+30i}{4+12i-12i-36i^2} =$$

$$\frac{10+30i}{4-36i^2} = \frac{10+30i}{4+36}$$

$$= \frac{10+30i}{40}$$

$$\frac{10}{40} + \frac{30}{40}i$$

$$\frac{1}{4} + \frac{3}{4}i$$

$$\frac{-3}{(5+i)}\frac{(5-i)}{(5-i)} = \frac{-15+3i}{25-5i+5i-i^2}$$

$$= \frac{-15+3i}{25-i^2}$$

$$= \frac{-15+3i}{25+1}$$

$$= \frac{-15+3i}{26} = -\frac{15}{26} + \frac{3}{26}i$$

2.4 Practice

18, 21

25, 27, 29

31, 33