Download this PDF to your computer and go to
www.livescribe.com/player
On iOS, open the PDF in Livescribe+.

11-Sept/2019

1.3 Complex Numbers $\boxed{p.33}$

Imaginary Numbers

Tools for the number sistem

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

- if b is a positive real number, then

$\sqrt{-b} = i\sqrt{b}$
$\sqrt{-3} = i\sqrt{3}$

★ Examples on the Lecture Notes ★ $\boxed{p.34}$

a. $\sqrt{-25} = 5i \xrightarrow{\text{How?}}$ ① $\sqrt{-25} = i\sqrt{25} = 5i$

b. $\sqrt{-12} = 2\sqrt{3}i$ or $2i\sqrt{3}$ $\xrightarrow{\text{How?}}$ $\sqrt{-12} = i\sqrt{12} = i \cdot 2\sqrt{3}$
$= 2i\sqrt{3}$ or $2\sqrt{3}i$

c. $\sqrt{-13} = i\sqrt{13}$ or $\sqrt{13}i$

→ Problems (Answers) ★ Write in terms of i.

① $\sqrt{-27}$

$i\sqrt{27}$
$i\sqrt{3 \cdot 3 \cdot 3}$
$3i\sqrt{3}$

27
3 9
3 3

② $\sqrt{-63}$

$i\sqrt{63}$
$i\sqrt{3 \cdot 3 \cdot 7}$
$3i\sqrt{7}$ or $3\sqrt{7}i$

63
7 9
3 3

④ $\sqrt{-11}$

$-i\sqrt{11}$ or $-\sqrt{11}i$

$-\sqrt{-9}$
$-i\sqrt{9}$
$-i \cdot 3$
$= -3i$

livescribe

11-Sept-2019

1.3 Complex Numbers p.33

Imaginary Numbers

Tools for the number system

- $i = \sqrt{-1}$
- $i^2 = -1$
- if b is a positive real number, then

$$\sqrt{-b} = i\sqrt{b}$$
$$\sqrt{-3} = i\sqrt{3}$$

★ Examples on the Lecture Notes ★ p.34

a. $\sqrt{-25} = 5i$ How? → ① $\sqrt{-25} = i\sqrt{25} = 5i$

b. $\sqrt{-12} = 2\sqrt{3}i$ or $2i\sqrt{3}$ How? $\sqrt{-12} = i\sqrt{12} = i \cdot 2\sqrt{3}$ $= 2i\sqrt{3}$ or $2\sqrt{3}i$

c. $\sqrt{-13} = i\sqrt{13}$ or $\sqrt{13}i$

→ Problems (Answers) ★ Write in terms of i.

① $\sqrt{-27}$

$i\sqrt{27}$

$i\sqrt{3 \cdot 3 \cdot 3}$

$3i\sqrt{3}$

27 = 3 · 9, 9 = 3 · 3

② $\sqrt{-63}$

$i\sqrt{63}$

$i\sqrt{3 \cdot 3 \cdot 7}$

$3i\sqrt{7}$ or $3\sqrt{7}i$

63 = 7 · 9, 9 = 3 · 3

④ $\sqrt{-11}$

$-i\sqrt{11}$ or $-\sqrt{11}i$

$-\sqrt{-9}$

$-i\sqrt{9}$

$-i \cdot 3$

$= -3i$

1.4 Quadratic Equations p. 35

→ Zero Product Property

if $mn = 0$; then $m = 0$ or $n = 0$.

→ Steps for solving a quadratic equation using the zero product property:

① Use algebraic properties to write the equation in $ax^2 + bx + c = 0$ form

② Factor the non-zero side

③ Apply the Zero Product Property

④ Solve the resulting equation(s) for the value(s) of the variables

★ Examples on Lecture notes ★ p. 36

→ Problems w/ Answers p. 36

① $(v-5)(v+6) = 0$

$v - 5 = 0$ or $v + 6 = 0$

$v = 5$ or $v = -6$

$\{5, -6\}$

② $u^2 = -10u$

$u^2 + 10u = 0$

$u(u+10) = 0$

$u = 0$ or $u + 10 = 0$

$u = -10$

$\{0, -10\}$

③ $v^2 + v - 30 = 0$

$(v+6)(v-5) = 0$

$v+6=0$ $\quad$ $v-5=0$

$\boxed{v=-6}$ $\quad$ $\boxed{v=5}$

④ $5y^2 + 16y = (13) - 3$

~~$(5y^2 + 16y = 13 - 3)$~~

$5y^2 + 16y + 3 = 0$

$a=5 ; b=16 ; c=13$

$ac = 5 \cdot 3 = 15$

1 15 ← ?

2

3 5 ← ?

4

5 3

⑤ $(x-1)^2 = 2x^2 - 7x - 13$

$(x-1)(x-1) = 2x^2 - 7x - 13$

$x^2 - 1x - 1x + 1 = 2x^2 - 7x - 13$

$x^2 - 2x + 1 = 2x^2 - 7x - 13$

$-x^2 + 2x - 1 \quad\quad -x^2 + 2x - 1$

$0 = 1x^2 - 5x - 14$

$0 = x^2 - 5x - 14$

$0 = (x-7)(x+2)$

$x-7=0$ $\quad$ $x+2=0$

$\boxed{x=7}$ $\quad$ $\boxed{x=-2}$

$\{-2, 7\}$

$5y^2 + 1y + 15y + 3 = 0$

$y(5y+1) + 3(5y+1)$

$(5y+1)(y+3) = 0$

$5y + 1 = 0$ $\quad$ $y + 3 = 0$

$\frac{5y}{5} = \frac{-1}{5}$ $\quad$ $y = -3$

$y = \frac{-1}{5}$

$\{-1/5, -3\}$

- Solve Quadratic Equations by Using the Square Root Property

Left Side	Right Side
(a²) Drop the square	$\pm\sqrt{\ }$ (plus or minus) (square root)

→ Square Root Property

if $(\text{expression})^2 = k$,

then $\text{expression} = \pm\sqrt{k}$

★ Examples on Lecture Notes ★ p. 37 ↓ problems too

We're going pretty well!!
– Prof. Lacoste

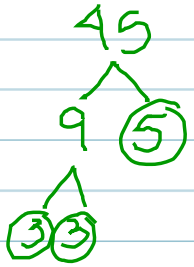
→ Problems w/ Answers p.37

① $x^2 = 45$

$x = \pm\sqrt{45}$

$x = \pm\sqrt{3\cdot3\cdot5}$

$x = \pm 3\sqrt{5}$

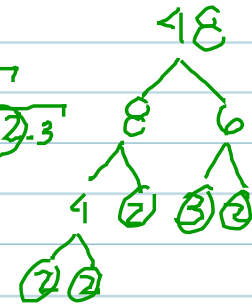


② $x^2 = -48$

$x = \pm\sqrt{-48}$

$x = \pm i\sqrt{2\cdot2\cdot2\cdot2\cdot3}$

$x = \pm 4i\sqrt{3}$



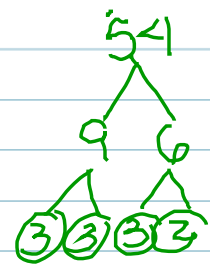
③ $(v-5)^2 - 54 = 0$

$v - 5 = \pm\sqrt{54}$

$v - 5 = \pm\sqrt{3\cdot3\cdot3\cdot2}$

$v - 5 = \pm 3\sqrt{6}$

$v = \pm -5 \pm 3\sqrt{6}$



Solve Quadratic by...

Factoring	Square root prop.	Quadratic Form
① get = 0	① Put in form (expression)^2 = K	① Put in form $ax^2+bx+c=0$
② factor	② Left: drop square Right: $K \pm \sqrt{\ }$	② Identify a, b, and c
③ zero-prod. prop.	③ Solve for variable	③ Put in formula sing ♫ ✓ ☺
④ Solve each equation		

p.38

• Solve Quadratic Equations by the Quadratic Formula

Step for Solving ↗:

① Use algebraic properties to write the equation in $ax^2+bx+c=0$.

② Identify the values of the coefficient a, b, and c.

③ Plug them into the quadratic formula to find the solution(s) of the quadratic equation.