

$$\left(x + \frac{1}{2}\right)^2 = x^2 + x + \frac{1}{4}$$

左の辺と右の辺を入れかえる。

$$x^2 + x + \frac{1}{4} = \left(x + \frac{1}{2}\right)^2$$

両辺から定数項の $\frac{1}{4}$ を引く

$$x^2 + x = \left(x + \frac{1}{2}\right)^2 - \frac{1}{4}$$

$$\left(x + \frac{3}{2}\right)^2 = x^2 + 3x + \frac{9}{4}$$

$$x^2 + 3x + \frac{9}{4} = \left(x + \frac{3}{2}\right)^2$$

$$x^2 + 3x = \left(x + \frac{3}{2}\right)^2 - \frac{9}{4}$$

理解できたら、見ずに写しなさい。

Ⅲ 2次方程式 A 平方根の形で解く Dp-43

前10-シ)にならって、次の式を完成しなさい。

$$\begin{aligned} (x + \frac{5}{2})^2 &= x^2 + 5x + \frac{25}{4} \\ x^2 + 5x + \frac{25}{4} &= (x + \frac{5}{2})^2 \\ x^2 + 5x &= (x + \frac{5}{2})^2 - \frac{25}{4} \end{aligned}$$

$$\begin{aligned} (x + \frac{7}{2})^2 &= x^2 + 7x + \frac{49}{4} \\ x^2 + 7x + \frac{49}{4} &= (x + \frac{7}{2})^2 \\ x^2 + 7x &= (x + \frac{7}{2})^2 - \frac{49}{4} \end{aligned}$$

$$\begin{aligned} (x + \frac{9}{2})^2 &= x^2 + 9x + \frac{81}{4} \\ x^2 + 9x + \frac{81}{4} &= (x + \frac{9}{2})^2 \\ x^2 + 9x &= (x + \frac{9}{2})^2 - \frac{81}{4} \end{aligned}$$

$$(x - \frac{1}{2})^2 = x^2 - x + \frac{1}{4}$$

左辺と右辺を入れかえり

$$x^2 - x + \frac{1}{4} = (x - \frac{1}{2})^2$$

両辺から定数項の $\frac{1}{4}$ を引いて

$$x^2 - x = (x - \frac{1}{2})^2 - \frac{1}{4}$$

$$(x - \frac{3}{2})^2 = x^2 - 3x + \frac{9}{4}$$

$$x^2 - 3x + \frac{9}{4} = (x - \frac{3}{2})^2$$

$$x^2 - 3x = (x - \frac{3}{2})^2 - \frac{9}{4}$$

理解できたら見ず：写しなさい。

前10-31にならって、次の式を完成しなさい。

$$(x - \frac{1}{2})^2 = x^2 - x + \frac{1}{4}$$

$$x^2 - x + \frac{1}{4} = (x - \frac{1}{2})^2$$

$$x^2 - x = (x - \frac{1}{2})^2 - \frac{1}{4}$$

$$(x - \frac{3}{2})^2 = x^2 - 3x + \frac{9}{4}$$

$$x^2 - 3x + \frac{9}{4} = (x - \frac{3}{2})^2$$

$$x^2 - 3x = (x - \frac{3}{2})^2 - \frac{9}{4}$$

$$(x - \frac{5}{2})^2 = x^2 - 5x + \frac{25}{4}$$

$$x^2 - 5x + \frac{25}{4} = (x - \frac{5}{2})^2$$

$$x^2 - 5x = (x - \frac{5}{2})^2 - \frac{25}{4}$$

$$(x - \frac{7}{2})^2 = x^2 - 7x + \frac{49}{4}$$

$$x^2 - 7x + \frac{49}{4} = (x - \frac{7}{2})^2 - \frac{49}{4}$$

平方の形にする

$$x^2 + 2x = 1$$

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

$$(x+1)^2 = 2$$

$$x^2 + 2x = 4$$

$$(x+1)^2 - 1 = 4$$

$$(x+1)^2 = 5$$

上のように.

$$x^2 + 2x = 1 \text{ を}$$

$$(x+1)^2 = 2 \text{ とすることを}$$

平方の形にする

とすることにします。

$$x^2 + 2x = 5$$

$$(x+1)^2 - 1 = 5$$

$$(x+1)^2 = 6$$

$$x^2 + 2x = 2$$

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

$$(x+1)^2 = 3$$

$$x^2 + 2x = 6$$

$$(x+1)^2 - 1 = 6$$

$$(x+1)^2 = 7$$

$$x^2 + 2x = 3$$

$$(x+1)^2 - 1 = 3$$

$$(x+1)^2 = 4$$

$$x^2 + 2x = 7$$

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

$$(x+1)^2 = 8$$

上と同じように

次の2次方程式を

平方の形にします。

Ⅲ 2次方程式 [A] 平方根の形で解く 1b-⑤イ

次の2次方程式を

平方の形に直しなさい。

$$x^2 + 2x = 3$$

$$(x+1)^2 - 1 = 3$$

$$(x+1)^2 = 4$$

$$x^2 - 2x = 3$$

$$(x-1)^2 - 1 = 3$$

$$(x-1)^2 = 4$$

$$x^2 + 4x = 3$$

$$(x+2)^2 - 4 = 3$$

$$(x+2)^2 = 7$$

$$x^2 - 4x = 3$$

$$(x-2)^2 - 4 = 3$$

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

$$x^2 + 6x = 3$$

$$(x+3)^2 - 9 = 3$$

$$(x+3)^2 = 12$$

$$x^2 - 6x = 3$$

$$(x-3)^2 - 9 = 3$$

$$(x-3)^2 = 12$$

$$x^2 + 8x = 3$$

$$(x+4)^2 - 16 = 3$$

$$(x+4)^2 = 19$$

$$x^2 - 8x = 3$$

$$(x-4)^2 - 16 = 3$$

$$(x-4)^2 = 19$$

III 2次方程式 A 平方根の形で解く D6-57)

※ $(x+1)^2 = 25$

右辺を展開して

$$x^2 + 2x + 1 = 25$$

(両辺から1を引いて)

$$x^2 + 2x = 24$$

[両辺から24を引いて]

$$x^2 + 2x - 24 = 0$$

この式からスタートして
xを求める方法を示します。

$$x^2 + 2x = 24$$

$$(x+1)^2 - 1 = 24$$

※ $(x+1)^2 = 25$

$$x+1 = \pm 5$$

$$x = -1 \pm 5$$

$$= 4, -6$$

左にならうて右の式の変化を考えなさい。

$$(x+1)^2 = 16$$

$$x^2 + 2x + 1 = 16$$

()

$$x^2 + 2x = 15$$

[15]

$$x^2 + 2x - 15 = 0$$

$$x^2 + 2x = 15$$

$$(x+1)^2 - 1 = 15$$

$$(x+1)^2 = 16$$

$$x+1 = \pm 4$$

$$x = -1 \pm 4$$

$$= 3, -5$$

Ⅲ 2次方程式 [A] 平方根の形で解く Dp-52ア

例

$$x^2 - 2x = 1$$

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

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

$$x^2 - 2x = 2$$

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

$$(x-1)^2 = 3$$

例にならって、
平方の形にしたい。

$$x^2 - 4x = 1$$

$$(x-2)^2 - 4 = 1$$

$$(x-2)^2 = 5$$

$$x^2 - 4x = 3$$

$$(x-2)^2 - 4 = 3$$

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

$$x^2 - 6x = 1$$

$$(x-3)^2 - 9 = 1$$

$$(x-3)^2 = 10$$

$$x^2 - 6x = 4$$

$$(x-3)^2 - 9 = 4$$

$$(x-3)^2 = 13$$

$$x^2 - 8x = 1$$

$$(x-4)^2 - 16 = 1$$

$$(x-4)^2 = 17$$

$$x^2 - 8x = 5$$

$$(x-4)^2 - 16 = 5$$

$$(x-4)^2 = 21$$

例

$$x^2 + x = 1$$

$$(x + \frac{1}{2})^2 - \frac{1}{4} = 1$$

$$(x + \frac{1}{2})^2 = \frac{5}{4}$$

$$x^2 + x = 2$$

$$(x + \frac{1}{2})^2 - \frac{1}{4} = \frac{8}{4}$$

$$(x + \frac{1}{2})^2 = \frac{9}{4}$$

例にならって

平方の形にしなさい。

$$x^2 + 3x = 1$$

$$(x + \frac{3}{2})^2 - \frac{9}{4} = \frac{4}{4}$$

$$(x + \frac{3}{2})^2 = \frac{13}{4}$$

$$x^2 + 3x = 2$$

$$(x + \frac{3}{2})^2 - \frac{9}{4} = \frac{8}{4}$$

$$(x + \frac{3}{2})^2 = \frac{17}{4}$$

$$x^2 + 5x = 1$$

$$(x + \frac{5}{2})^2 - \frac{25}{4} = \frac{4}{4}$$

$$(x + \frac{5}{2})^2 = \frac{29}{4}$$

$$x^2 + 5x = 3$$

$$(x + \frac{5}{2})^2 - \frac{25}{4} = \frac{12}{4}$$

$$(x + \frac{5}{2})^2 = \frac{37}{4}$$

例

$$x^2 - x = 1$$

$$(x - \frac{1}{2})^2 - \frac{1}{4} = 1$$

$$(x - \frac{1}{2})^2 = \frac{5}{4}$$

例にならう。

前例の式のうち

x の係数を負にして

平方の形にしたい。

$$x^2 - x = 2$$

$$(x - \frac{1}{2})^2 - \frac{1}{4} = \frac{8}{4}$$

$$(x - \frac{1}{2})^2 = \frac{9}{4}$$

$$x^2 - 3x = 1$$

$$(x - \frac{3}{2})^2 - \frac{9}{4} = \frac{4}{4}$$

$$(x - \frac{3}{2})^2 = \frac{13}{4}$$

$$x^2 - 3x = 2$$

$$(x - \frac{3}{2})^2 - \frac{9}{4} = \frac{8}{4}$$

$$(x - \frac{3}{2})^2 = \frac{17}{4}$$

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

$$(x - \frac{5}{2})^2 - \frac{25}{4} = \frac{4}{4}$$

$$(x - \frac{5}{2})^2 = \frac{29}{4}$$

$$x^2 - 5x = 3$$

$$(x - \frac{5}{2})^2 - \frac{25}{4} = \frac{12}{4}$$

$$(x - \frac{5}{2})^2 = \frac{37}{4}$$

III 2次方程式 [A] 平方根の形で解く Pb-(6)

$x^2 + x = 0$ を 2通りの方法で解いてみます。

平方完成の方法の準備

$$\left(x + \frac{1}{2}\right)^2 = x^2 + x + \frac{1}{4}$$

左辺と右辺を入れかえて。[A=B ならば B=Aだから。]

$$x^2 + x + \frac{1}{4} = \left(x + \frac{1}{2}\right)^2$$

両辺から $\frac{1}{4}$ をひいて。

$$x^2 + x = \left(x + \frac{1}{2}\right)^2 - \frac{1}{4}$$

平方根の方法

↓

$$x^2 + x = 0$$

$$\left(x + \frac{1}{2}\right)^2 - \frac{1}{4} = 0$$

$$\left(x + \frac{1}{2}\right)^2 = \frac{1}{4}$$

$$x + \frac{1}{2} = \pm \frac{1}{2}$$

$$x = -\frac{1}{2} \pm \frac{1}{2}$$

$$x = -\frac{1}{2} + \frac{1}{2} = 0, \quad x = -\frac{1}{2} - \frac{1}{2} = -1$$

因数分解の方法。

$$x^2 + x = 0$$

$$x(x+1) = 0$$

$$x = 0, -1$$

このもんだいでは。

たぶん、因数分解の方法が
カンタンです。

しかし、複雑な数になると

因数分解ではできなく
なります。

上記のことを、見ずには書けるようになるまで 写しなさい。

Ⅲ 2次方程式 [A] 平方根の形で解く Dp-62

2次方程式を平方の形にしてから解いてみます

$$x^2 + 2x - 3 = 0$$

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

だから

$$(x+1)^2 - 1 - 3 = 0$$

$$(x+1)^2 = 4$$

$$x+1 = \pm 2$$

$$x = -1 \pm 2$$

$$x = 1, -3$$

$$x^2 - 2x - 3 = 0$$

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

だから

$$(x-1)^2 - 1 - 3 = 0$$

$$(x-1)^2 = 4$$

$$x-1 = \pm 2$$

$$x = 1 \pm 2$$

$$x = 3, -1$$

理解できたら、見ずに写しなさい。

Ⅲ 2次方程式 [A] 平方根の形で解く Dp- (63)

次の2次方程式は、

因数分解の形で解けますが、

平方の形にして解きなさい。

$$x^2 + 2x = 0$$

$$(x+1)^2 - 1 = 0$$

$$(x+1)^2 = 1$$

$$x+1 = \pm 1$$

$$x = -1 \pm 1$$

$$x = 0, -2$$

$$x^2 + 2x - 3 = 0$$

$$(x+1)^2 - 1 - 3 = 0$$

$$(x+1)^2 = 4$$

$$x+1 = \pm 2$$

$$x = -1 \pm 2$$

$$x = 1, -3$$

$$x^2 + 2x - 8 = 0$$

$$(x+1)^2 - 1 - 8 = 0$$

$$(x+1)^2 = 9$$

$$x+1 = \pm 3$$

$$x = -1 \pm 3$$

$$x = 2, -4$$

$$x^2 + 2x - 15 = 0$$

$$(x+1)^2 - 1 - 15 = 0$$

$$(x+1)^2 = 16$$

$$x+1 = \pm 4$$

$$x = -1 \pm 4$$

$$x = 3, -5$$

$$x^2 - 2x = 0$$

$$(x-1)^2 - 1 = 0$$

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

$$x-1 = \pm 1$$

$$x = 1 \pm 1$$

$$x = 2, 0$$

$$x^2 - 2x - 3 = 0$$

$$(x-1)^2 - 1 - 3 = 0$$

$$(x-1)^2 = 4$$

$$x-1 = \pm 2$$

$$x = 1 \pm 2$$

$$x = 3, -1$$

$$x^2 - 2x - 8 = 0$$

$$(x-1)^2 - 1 - 8 = 0$$

$$(x-1)^2 = 9$$

$$x-1 = \pm 3$$

$$x = 1 \pm 3$$

$$x = 4, -2$$

$$x^2 - 2x - 15 = 0$$

$$(x-1)^2 - 1 - 15 = 0$$

$$(x-1)^2 = 16$$

$$x-1 = \pm 4$$

$$x = 1 \pm 4$$

$$x = 5, -3$$

$$x^2 + 4x + 3 = 0$$

$$(x+2)^2 - 4 + 3 = 0$$

$$(x+2)^2 = 1$$

$$x+2 = \pm 1$$

$$x = -2 \pm 1$$

$$x = -1, -3$$

$$x^2 - 4x + 3 = 0$$

$$(x-2)^2 - 4 + 3 = 0$$

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

$$x-2 = \pm 1$$

$$x = 2 \pm 1$$

$$x = 3, 1$$

$$x^2 + 4x = 0$$

$$(x+2)^2 - 4 = 0$$

$$(x+2)^2 = 4$$

$$x+2 = \pm 2$$

$$x = -2 \pm 2$$

$$x = 0, -4$$

$$x^2 - 4x = 0$$

$$(x-2)^2 - 4 = 0$$

$$(x-2)^2 = 4$$

$$x-2 = \pm 2$$

$$x = 2 \pm 2$$

$$x = 4, 0$$

$$x^2 + 4x - 5 = 0$$

$$(x+2)^2 - 4 - 5 = 0$$

$$(x+2)^2 = 9$$

$$x+2 = \pm 3$$

$$x = -2 \pm 3$$

$$x = 1, -5$$

$$x^2 - 4x - 5 = 0$$

$$(x-2)^2 - 4 - 5 = 0$$

$$(x-2)^2 = 9$$

$$x-2 = \pm 3$$

$$x = 2 \pm 3$$

$$x = 5, -1$$

$$x^2 + 4x - 12 = 0$$

$$(x+2)^2 - 4 - 12 = 0$$

$$(x+2)^2 = 16$$

$$x+2 = \pm 4$$

$$x = -2 \pm 4$$

$$x = 2, -6$$

$$x^2 - 4x - 12 = 0$$

$$(x-2)^2 - 4 - 12 = 0$$

$$(x-2)^2 = 16$$

$$x-2 = \pm 4$$

$$x = 2 \pm 4$$

$$x = 6, -2$$

$$x^2 + 6x + 8 = 0$$

$$\begin{aligned} (x+3)^2 - 9 + 8 &= 0 \\ (x+3)^2 &= 1 \\ x+3 &= \pm 1 \\ x &= -3 \pm 1 \\ x &= -2, -4 \end{aligned}$$

$$x^2 - 6x + 8 = 0$$

$$\begin{aligned} (x-3)^2 - 9 + 8 &= 0 \\ (x-3)^2 &= 1 \\ x-3 &= \pm 1 \\ x &= 3 \pm 1 \\ x &= 4, 2 \end{aligned}$$

$$x^2 + 6x + 5 = 0$$

$$\begin{aligned} (x+3)^2 - 9 + 5 &= 0 \\ (x+3)^2 &= 4 \\ x+3 &= \pm 2 \\ x &= -3 \pm 2 \\ x &= -1, -5 \end{aligned}$$

$$x^2 - 6x + 5 = 0$$

$$\begin{aligned} (x-3)^2 - 9 + 5 &= 0 \\ (x-3)^2 &= 4 \\ x-3 &= \pm 2 \\ x &= 3 \pm 2 \\ x &= 5, 1 \end{aligned}$$

$$x^2 + 6x = 0$$

$$\begin{aligned} (x+3)^2 - 9 &= 0 \\ (x+3)^2 &= 9 \\ x+3 &= \pm 3 \\ x &= -3 \pm 3 \\ x &= 0, -6 \end{aligned}$$

$$x^2 - 6x = 0$$

$$\begin{aligned} (x-3)^2 - 9 &= 0 \\ (x-3)^2 &= 9 \\ x-3 &= \pm 3 \\ x &= 3 \pm 3 \\ x &= 6, 0 \end{aligned}$$

$$x^2 + 6x - 7 = 0$$

$$\begin{aligned} (x+3)^2 - 9 - 7 &= 0 \\ (x+3)^2 &= 16 \\ x+3 &= \pm 4 \\ x &= -3 \pm 4 \\ x &= 1, -7 \end{aligned}$$

$$x^2 - 6x - 7 = 0$$

$$\begin{aligned} (x-3)^2 - 9 - 7 &= 0 \\ (x-3)^2 &= 16 \\ x-3 &= \pm 4 \\ x &= 3 \pm 4 \\ x &= 7, -1 \end{aligned}$$

$$x^2 + 8x + 15 = 0$$

$$(x+4)^2 - 16 + 15 = 0$$

$$(x+4)^2 = 1$$

$$x+4 = \pm 1$$

$$x = -4 \pm 1$$

$$x = -3, -5$$

$$x^2 - 8x + 15 = 0$$

$$(x-4)^2 - 16 + 15 = 0$$

$$(x-4)^2 = 1$$

$$x-4 = \pm 1$$

$$x = 4 \pm 1$$

$$x = 5, 3$$

$$x^2 + 8x + 12 = 0$$

$$(x+4)^2 - 16 + 12 = 0$$

$$(x+4)^2 = 4$$

$$x+4 = \pm 2$$

$$x = -4 \pm 2$$

$$x = -2, -6$$

$$x^2 - 8x + 12 = 0$$

$$(x-4)^2 - 16 + 12 = 0$$

$$(x-4)^2 = 4$$

$$x-4 = \pm 2$$

$$x = 4 \pm 2$$

$$x = 6, 2$$

$$x^2 + 8x + 7 = 0$$

$$(x+4)^2 - 16 + 7 = 0$$

$$(x+4)^2 = 9$$

$$x+4 = \pm 3$$

$$x = -4 \pm 3$$

$$x = -1, -7$$

$$x^2 - 8x + 7 = 0$$

$$(x-4)^2 - 16 + 7 = 0$$

$$(x-4)^2 = 9$$

$$x-4 = \pm 3$$

$$x = 4 \pm 3$$

$$x = 7, 1$$

$$x^2 + 8x = 0$$

$$(x+4)^2 - 16 = 0$$

$$(x+4)^2 = 16$$

$$x+4 = \pm 4$$

$$x = -4 \pm 4$$

$$x = 0, -8$$

$$x^2 - 8x = 0$$

$$(x-4)^2 - 16 = 0$$

$$(x-4)^2 = 16$$

$$x-4 = \pm 4$$

$$x = 4 \pm 4$$

$$x = 8, 0$$

$$x^2 + 8x - 9 = 0$$

$$(x+4)^2 - 16 - 9 = 0$$

$$(x+4)^2 = 25$$

$$x+4 = \pm 5$$

$$x = -4 \pm 5$$

$$x = 1, -9$$

$$x^2 - 8x - 9 = 0$$

$$(x-4)^2 - 16 - 9 = 0$$

$$(x-4)^2 = 25$$

$$x-4 = \pm 5$$

$$x = 4 \pm 5$$

$$x = 9, -1$$

$$x^2 + 2x + 1 = 2$$

$$\begin{aligned} (x+1)^2 &= 2 \\ x+1 &= \pm\sqrt{2} \\ x &= -1 \pm \sqrt{2} \end{aligned}$$

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

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

$$x^2 + 2x - 1 = 0$$

$$\begin{aligned} (x+1)^2 - 1 - 1 &= 0 \\ (x+1)^2 &= 2 \\ x+1 &= \pm\sqrt{2} \\ x &= -1 \pm \sqrt{2} \end{aligned}$$

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

$$\begin{aligned} (x-1)^2 - 1 - 1 &= 0 \\ (x-1)^2 &= 2 \end{aligned}$$

$$x^2 + 2x + 1 = 3$$

$$\begin{aligned} (x+1)^2 &= 3 \\ x+1 &= \pm\sqrt{3} \\ x &= -1 \pm \sqrt{3} \end{aligned}$$

$$x^2 - 2x + 1 = 3$$

$$\begin{aligned} (x-1)^2 &= 3 \\ x-1 &= \pm\sqrt{3} \\ x &= 1 \pm \sqrt{3} \end{aligned}$$

$$x^2 + 2x - 2 = 0$$

$$\begin{aligned} (x+1)^2 - 1 - 2 &= 0 \\ (x+1)^2 &= 3 \\ x+1 &= \pm\sqrt{3} \\ x &= -1 \pm \sqrt{3} \end{aligned}$$

$$x^2 - 2x - 2 = 0$$

$$\begin{aligned} (x-1)^2 - 1 - 2 &= 0 \\ (x-1)^2 &= 3 \\ x-1 &= \pm\sqrt{3} \\ x &= 1 \pm \sqrt{3} \end{aligned}$$

$$x^2 + 2x + 1 = 5$$

$$\begin{aligned} (x+1)^2 &= 5 \\ x+1 &= \pm\sqrt{5} \\ x &= -1 \pm \sqrt{5} \end{aligned}$$

$$x^2 - 2x + 1 = 5$$

$$\begin{aligned} (x-1)^2 &= 5 \\ x-1 &= \pm\sqrt{5} \\ x &= 1 \pm \sqrt{5} \end{aligned}$$

$$x^2 + 2x - 4 = 0$$

$$\begin{aligned} (x+1)^2 - 1 - 4 &= 0 \\ (x+1)^2 &= 5 \\ x+1 &= \pm\sqrt{5} \\ x &= -1 \pm \sqrt{5} \end{aligned}$$

$$x^2 - 2x - 4 = 0$$

$$\begin{aligned} (x-1)^2 - 1 - 4 &= 0 \\ (x-1)^2 &= 5 \\ x-1 &= \pm\sqrt{5} \\ x &= 1 \pm \sqrt{5} \end{aligned}$$

$$x^2 + 2x + 1 = 6$$

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

$$x^2 - 2x + 1 = 6$$

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

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

$$\begin{aligned} (x+1)^2 - 1 - 5 &= 0 \\ (x+1)^2 &= 6 \\ x+1 &= \pm\sqrt{6} \\ x &= -1 \pm \sqrt{6} \end{aligned}$$

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

$$\begin{aligned} (x-1)^2 - 1 - 5 &= 0 \\ (x-1)^2 &= 6 \\ x-1 &= \pm\sqrt{6} \\ x &= 1 \pm \sqrt{6} \end{aligned}$$

III 2次方程式 [A] 平方根の形で解く Pb-⑦①

因数分解の形では解けません
平方の形で解きなさい。

$$x^2 + 2x - 1 = 0$$

$$\begin{aligned} (x+1)^2 - 1 - 1 &= 0 \\ (x+1)^2 &= 2 \\ x+1 &= \pm\sqrt{2} \\ x &= -1 \pm \sqrt{2} \end{aligned}$$

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

$$\begin{aligned} (x-1)^2 - 1 - 1 &= 0 \\ (x-1)^2 &= 2 \\ x-1 &= \pm\sqrt{2} \\ x &= 1 \pm \sqrt{2} \end{aligned}$$

$$x^2 + 2x - 4 = 0$$

$$\begin{aligned} (x+1)^2 - 1 - 4 &= 0 \\ (x+1)^2 &= 5 \\ x+1 &= \pm\sqrt{5} \\ x &= -1 \pm \sqrt{5} \end{aligned}$$

$$x^2 - 2x - 4 = 0$$

$$\begin{aligned} (x-1)^2 - 1 - 4 &= 0 \\ (x-1)^2 &= 5 \\ x-1 &= \pm\sqrt{5} \\ x &= 1 \pm \sqrt{5} \end{aligned}$$

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

$$\begin{aligned} (x+1)^2 - 1 - 5 &= 0 \\ (x+1)^2 &= 6 \\ x+1 &= \pm\sqrt{6} \\ x &= -1 \pm \sqrt{6} \end{aligned}$$

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

$$\begin{aligned} (x-1)^2 - 1 - 5 &= 0 \\ (x-1)^2 &= 6 \\ x-1 &= \pm\sqrt{6} \\ x &= 1 \pm \sqrt{6} \end{aligned}$$

$$x^2 + 2x - 6 = 0$$

$$\begin{aligned} (x+1)^2 - 1 - 6 &= 0 \\ (x+1)^2 &= 7 \\ x+1 &= \pm\sqrt{7} \\ x &= -1 \pm \sqrt{7} \end{aligned}$$

$$x^2 - 2x - 6 = 0$$

$$\begin{aligned} (x-1)^2 - 1 - 6 &= 0 \\ (x-1)^2 &= 7 \\ x-1 &= \pm\sqrt{7} \\ x &= 1 \pm \sqrt{7} \end{aligned}$$

$$x^2 + 2x - 7 = 0$$

$$\begin{aligned} (x+1)^2 - 1 - 7 &= 0 \\ (x+1)^2 &= 8 \\ x+1 &= \pm\sqrt{8} \\ x &= -1 \pm 2\sqrt{2} \end{aligned}$$

$$x^2 - 2x - 7 = 0$$

$$\begin{aligned} (x-1)^2 - 1 - 7 &= 0 \\ (x-1)^2 &= 8 \\ x-1 &= \pm\sqrt{8} \\ x &= 1 \pm 2\sqrt{2} \end{aligned}$$

$$x^2 + 4x + 3 = 0$$

$$(x+2)^2 - 4 + 3 = 0$$

$$(x+2)^2 = 1$$

$$x+2 = \pm 1$$

$$x = -2 \pm 1$$

$$x = -1, -3$$

$$x^2 + 4x + 2 = 0$$

$$(x+2)^2 - 4 + 2 = 0$$

$$(x+2)^2 = 2$$

$$x+2 = \pm\sqrt{2}$$

$$x = -2 \pm\sqrt{2}$$

$$x^2 + 4x + 1 = 0$$

$$(x+2)^2 - 4 + 1 = 0$$

$$(x+2)^2 = 3$$

$$x+2 = \pm\sqrt{3}$$

$$x = -2 \pm\sqrt{3}$$

$$x^2 + 4x - 1 = 0$$

$$(x+2)^2 - 4 - 1 = 0$$

$$(x+2)^2 = 5$$

$$x+2 = \pm\sqrt{5}$$

$$x = -2 \pm\sqrt{5}$$

$$x^2 + 4x - 2 = 0$$

$$(x+2)^2 - 4 - 2 = 0$$

$$(x+2)^2 = 6$$

$$x+2 = \pm\sqrt{6}$$

$$x = -2 \pm\sqrt{6}$$

$$x^2 + 4x - 3 = 0$$

$$(x+2)^2 - 4 - 3 = 0$$

$$(x+2)^2 = 7$$

$$x+2 = \pm\sqrt{7}$$

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

$$x^2 - 4x + 3 = 0$$

$$(x-2)^2 - 4 + 3 = 0$$

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

$$x-2 = \pm 1$$

$$x = 2 \pm 1$$

$$x = 3, 1$$

$$x^2 - 4x + 2 = 0$$

$$(x-2)^2 - 4 + 2 = 0$$

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

$$x-2 = \pm\sqrt{2}$$

$$x = 2 \pm\sqrt{2}$$

$$x^2 - 4x + 1 = 0$$

$$(x-2)^2 - 4 + 1 = 0$$

$$(x-2)^2 = 3$$

$$x-2 = \pm\sqrt{3}$$

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

$$x^2 - 4x - 1 = 0$$

$$(x-2)^2 - 4 - 1 = 0$$

$$(x-2)^2 = 5$$

$$x-2 = \pm\sqrt{5}$$

$$x = 2 \pm\sqrt{5}$$

$$x^2 - 4x - 2 = 0$$

$$(x-2)^2 - 4 - 2 = 0$$

$$(x-2)^2 = 6$$

$$x-2 = \pm\sqrt{6}$$

$$x = 2 \pm\sqrt{6}$$

$$x^2 - 4x - 3 = 0$$

$$(x-2)^2 - 4 - 3 = 0$$

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

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

$$x = 2 \pm\sqrt{7}$$

$$x^2 + 6x + 7 = 0$$

$$(x+3)^2 - 9 + 7 = 0$$

$$(x+3)^2 = 2$$

$$x+3 = \pm\sqrt{2}$$

$$x = -3 \pm \sqrt{2}$$

$$x^2 - 6x + 7 = 0$$

$$(x-3)^2 - 9 + 7 = 0$$

$$(x-3)^2 = 2$$

$$x-3 = \pm\sqrt{2}$$

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

$$x^2 + 6x + 6 = 0$$

$$(x+3)^2 - 9 + 6 = 0$$

$$(x+3)^2 = 3$$

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

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

$$x^2 - 6x + 6 = 0$$

$$(x-3)^2 - 9 + 6 = 0$$

$$(x-3)^2 = 3$$

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

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

$$x^2 + 6x + 5 = 0$$

$$(x+3)^2 - 9 + 5 = 0$$

$$(x+3)^2 = 4$$

$$x+3 = \pm 2$$

$$x = -3 \pm 2$$

$$x = -1, -5$$

$$x^2 - 6x + 5 = 0$$

$$(x-3)^2 - 9 + 5 = 0$$

$$(x-3)^2 = 4$$

$$x-3 = \pm 2$$

$$x = 3 \pm 2$$

$$x = 5, 1$$

$$x^2 + 6x + 4 = 0$$

$$(x+3)^2 - 9 + 4 = 0$$

$$(x+3)^2 = 5$$

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

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

$$x^2 - 6x + 4 = 0$$

$$(x-3)^2 - 9 + 4 = 0$$

$$(x-3)^2 = 5$$

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

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

$$x^2 + 6x + 3 = 0$$

$$(x+3)^2 - 9 + 3 = 0$$

$$(x+3)^2 = 6$$

$$x+3 = \pm\sqrt{6}$$

$$x = -3 \pm \sqrt{6}$$

$$x^2 - 6x + 3 = 0$$

$$(x-3)^2 - 9 + 3 = 0$$

$$(x-3)^2 = 6$$

$$x-3 = \pm\sqrt{6}$$

$$x = 3 \pm \sqrt{6}$$

$$x^2 + 6x + 2 = 0$$

$$(x+3)^2 - 9 + 2 = 0$$

$$(x+3)^2 = 7$$

$$x+3 = \pm\sqrt{7}$$

$$x = -3 \pm \sqrt{7}$$

$$x^2 - 6x + 2 = 0$$

$$(x-3)^2 - 9 + 2 = 0$$

$$(x-3)^2 = 7$$

$$x-3 = \pm\sqrt{7}$$

$$x = 3 \pm \sqrt{7}$$

$$x^2 + 6x + 1 = 0$$

$$(x+3)^2 - 9 + 1 = 0$$

$$(x+3)^2 = 8$$

$$x+3 = \pm\sqrt{8}$$

$$x = -3 \pm 2\sqrt{2}$$

$$x^2 - 6x + 1 = 0$$

$$(x-3)^2 - 9 + 1 = 0$$

$$(x-3)^2 = 8$$

$$x-3 = \pm\sqrt{8}$$

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

$$x^2 + 6x + 8 = 0$$

$$\begin{aligned} (x+3)^2 - 9 + 8 &= 0 \\ (x+3)^2 &= 1 \\ x+3 &= \pm 1 \\ x &= -3 \pm 1 \\ x &= -2, -4 \end{aligned}$$

$$x^2 - 6x + 8 = 0$$

$$\begin{aligned} (x-3)^2 - 9 + 8 &= 0 \\ (x-3)^2 &= 1 \\ x-3 &= \pm 1 \\ x &= 3 \pm 1 \\ x &= 4, 2 \end{aligned}$$

$$x^2 + 6x + 7 = 0$$

$$\begin{aligned} (x+3)^2 - 9 + 7 &= 0 \\ (x+3)^2 &= 2 \\ x+3 &= \pm\sqrt{2} \\ x &= -3 \pm\sqrt{2} \end{aligned}$$

$$x^2 - 6x + 7 = 0$$

$$\begin{aligned} (x-3)^2 - 9 + 7 &= 0 \\ (x-3)^2 &= 2 \\ x-3 &= \pm\sqrt{2} \\ x &= 3 \pm\sqrt{2} \end{aligned}$$

$$x^2 + 6x + 6 = 0$$

$$\begin{aligned} (x+3)^2 - 9 + 6 &= 0 \\ (x+3)^2 &= 3 \\ x+3 &= \pm\sqrt{3} \\ x &= -3 \pm\sqrt{3} \end{aligned}$$

$$x^2 - 6x + 6 = 0$$

$$\begin{aligned} (x-3)^2 - 9 + 6 &= 0 \\ (x-3)^2 &= 3 \\ x-3 &= \pm\sqrt{3} \\ x &= 3 \pm\sqrt{3} \end{aligned}$$

$$x^2 + 6x + 5 = 0$$

$$\begin{aligned} (x+3)^2 - 9 + 5 &= 0 \\ (x+3)^2 &= 4 \\ x+3 &= \pm 2 \\ x &= -3 \pm 2 \\ x &= -1, -5 \end{aligned}$$

$$x^2 - 6x + 5 = 0$$

$$\begin{aligned} (x-3)^2 - 9 + 5 &= 0 \\ (x-3)^2 &= 4 \\ x-3 &= \pm 2 \\ x &= 3 \pm 2 \\ x &= 5, 1 \end{aligned}$$

$$x^2 + 6x + 4 = 0$$

$$\begin{aligned} (x+3)^2 - 9 + 4 &= 0 \\ (x+3)^2 &= 5 \\ x+3 &= \pm\sqrt{5} \\ x &= -3 \pm\sqrt{5} \end{aligned}$$

$$x^2 - 6x + 4 = 0$$

$$\begin{aligned} (x-3)^2 - 9 + 4 &= 0 \\ (x-3)^2 &= 5 \\ x-3 &= \pm\sqrt{5} \\ x &= 3 \pm\sqrt{5} \end{aligned}$$

$$x^2 + 6x + 3 = 0$$

$$\begin{aligned} (x+3)^2 - 9 + 3 &= 0 \\ (x+3)^2 &= 6 \\ x+3 &= \pm\sqrt{6} \\ x &= -3 \pm\sqrt{6} \end{aligned}$$

$$x^2 - 6x + 3 = 0$$

$$\begin{aligned} (x-3)^2 - 9 + 3 &= 0 \\ (x-3)^2 &= 6 \\ x-3 &= \pm\sqrt{6} \\ x &= 3 \pm\sqrt{6} \end{aligned}$$

$$x^2 + 6x + 1 = 0$$

$$\begin{aligned} (x+3)^2 - 9 + 1 &= 0 \\ (x+3)^2 &= 8 \\ x+3 &= \pm\sqrt{8} \\ x &= -3 \pm 2\sqrt{2} \end{aligned}$$

$$x^2 - 6x + 2 = 0$$

$$\begin{aligned} (x-3)^2 - 9 + 2 &= 0 \\ (x-3)^2 &= 7 \\ x-3 &= \pm\sqrt{7} \\ x &= 3 \pm\sqrt{7} \end{aligned}$$

$$(x + \frac{1}{2})^2 = 1 \quad \leftarrow \quad x^2 + x + \frac{1}{4} = 1$$

$$x + \frac{1}{2} = \pm 1$$

$$x = -\frac{1}{2} \pm \frac{2}{2}$$

$$x = \frac{1}{2}, -\frac{3}{2}$$

$$x = \frac{-1 \pm 2}{2}$$

$$(x + \frac{1}{2})^2 = 2 \quad \leftarrow \quad x^2 + x + \frac{1}{4} = 2$$

$$x + \frac{1}{2} = \pm \sqrt{2}$$

$$x = -\frac{1}{2} \pm \sqrt{2}$$

$$= -\frac{1}{2} \pm \frac{2\sqrt{2}}{2}$$

$$\text{or } \frac{-1 \pm \sqrt{2}}{2}$$

$$(x + \frac{1}{2})^2 = 3 \quad \leftarrow \quad x^2 + x + \frac{1}{4} = 3$$

$$x + \frac{1}{2} = \pm \sqrt{3}$$

$$x = -\frac{1}{2} \pm \frac{2\sqrt{3}}{2}$$

$$x = \frac{-1 \pm 2\sqrt{3}}{2}$$

$$(x + \frac{1}{2})^2 = 4 \quad \leftarrow \quad x^2 + x + \frac{1}{4} = 4$$

$$x + \frac{1}{2} = \pm 2$$

$$x = -\frac{1}{2} \pm \frac{4}{2}$$

$$x = \frac{3}{2}, -\frac{5}{2}$$

$$x^2 + x - \frac{3}{4} = 0$$

$$(x + \frac{1}{2})^2 - \frac{1}{4} - \frac{3}{4} = 0$$

$$(x + \frac{1}{2})^2 = 1$$

$$x^2 - x - \frac{3}{4} = 0$$

$$(x - \frac{1}{2})^2 - \frac{1}{4} - \frac{3}{4} = 0$$

$$(x - \frac{1}{2})^2 = 1$$

$$x^2 + x - \frac{7}{4} = 0$$

$$(x + \frac{1}{2})^2 - \frac{1}{4} - \frac{7}{4} = 0$$

$$(x + \frac{1}{2})^2 = 2$$

$$x^2 - x - \frac{7}{4} = 0$$

$$(x - \frac{1}{2})^2 - \frac{1}{4} - \frac{7}{4} = 0$$

$$(x - \frac{1}{2})^2 = 2$$

$$x^2 + x - \frac{11}{4} = 0$$

$$(x + \frac{1}{2})^2 - \frac{1}{4} - \frac{11}{4} = 0$$

$$(x + \frac{1}{2})^2 = 3$$

$$x^2 - x - \frac{11}{4} = 0$$

$$(x - \frac{1}{2})^2 - \frac{1}{4} - \frac{11}{4} = 0$$

$$(x - \frac{1}{2})^2 = 3$$

$$x^2 + x - \frac{15}{4} = 0$$

$$(x + \frac{1}{2})^2 - \frac{1}{4} - \frac{15}{4} = 0$$

$$(x + \frac{1}{2})^2 = 4$$

$$x^2 - x - \frac{15}{4} = 0$$

$$(x - \frac{1}{2})^2 - \frac{1}{4} - \frac{15}{4} = 0$$

$$(x - \frac{1}{2})^2 = 4$$

$$(x + \frac{1}{3})^2 = 1 \quad \leftarrow \quad x^2 + \frac{2}{3}x + \frac{1}{9} = 1$$

$$x + \frac{1}{3} = \pm 1$$

$$x = -\frac{1}{3} \pm \frac{3}{3}$$

$$x = \frac{2}{3}, -\frac{4}{3}$$

$$(x + \frac{1}{3})^2 = 1$$

$$(x + \frac{1}{3})^2 = 2 \quad \leftarrow \quad x^2 + \frac{2}{3}x + \frac{1}{9} = 2$$

$$x + \frac{1}{3} = \pm \sqrt{2}$$

$$x = -\frac{1}{3} \pm \sqrt{2}$$

$$(x + \frac{1}{3})^2 = 2$$

$$(x + \frac{1}{3})^2 = 3 \quad \leftarrow \quad x^2 + \frac{2}{3}x + \frac{1}{9} = 3$$

$$x + \frac{1}{3} = \pm \sqrt{3}$$

$$x = -\frac{1}{3} \pm \sqrt{3}$$

$$(x + \frac{1}{3})^2 = 3$$

$$(x + \frac{1}{3})^2 = 4 \quad \leftarrow \quad x^2 + \frac{2}{3}x + \frac{1}{9} = 4$$

$$x + \frac{1}{3} = \pm 2$$

$$x = -\frac{1}{3} \pm \frac{6}{3}$$

$$x = \frac{5}{3}, -\frac{7}{3}$$

$$(x + \frac{1}{3})^2 = 4$$

$$x^2 + \frac{2}{3}x - \frac{8}{9} = 0$$

$$(x + \frac{1}{3})^2 - \frac{1}{9} - \frac{8}{9} = 0$$

$$(x + \frac{1}{3})^2 = 1$$

$$9x^2 + 6x - 8 = 0$$

$$x^2 + \frac{6}{9}x - \frac{8}{9} = 0$$

$$x^2 + \frac{2}{3}x - \frac{8}{9} = 0$$

$$x^2 + \frac{2}{3}x - \frac{17}{9} = 0$$

$$(x + \frac{1}{3})^2 - \frac{1}{9} - \frac{17}{9} = 0$$

$$(x + \frac{1}{3})^2 = 2$$

$$9x^2 + 6x - 17 = 0$$

$$x^2 + \frac{6}{9}x - \frac{17}{9} = 0$$

$$x^2 + \frac{2}{3}x - \frac{17}{9} = 0$$

$$x^2 + \frac{2}{3}x - \frac{26}{9} = 0$$

$$(x + \frac{1}{3})^2 - \frac{1}{9} - \frac{26}{9} = 0$$

$$(x + \frac{1}{3})^2 = 3$$

$$9x^2 + 6x - 26 = 0$$

$$x^2 + \frac{6}{9}x - \frac{26}{9} = 0$$

$$x^2 + \frac{2}{3}x - \frac{26}{9} = 0$$

$$x^2 + \frac{2}{3}x - \frac{35}{9} = 0$$

$$(x + \frac{1}{3})^2 - \frac{1}{9} - \frac{35}{9} = 0$$

$$(x + \frac{1}{3})^2 = 4$$

$$9x^2 + 6x - 35 = 0$$

$$x^2 + \frac{6}{9}x - \frac{35}{9} = 0$$

$$x^2 + \frac{2}{3}x - \frac{35}{9} = 0$$