More practice with quadratic equations

Practice

I will repeat what was said on the previous presentation - start solving quadratic by trying to factorize, if it doesn't work in few seconds, then switch either to completing the square or quadratic formula. The later two methods will always work if there are solutions, but are much slower.

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I will repeat what was said on the previous presentation - start solving quadratic by trying to factorize, if it doesn't work in few seconds, then switch either to completing the square or quadratic formula. The later two methods will always work if there are solutions, but are much slower.

Remember that when we use factorization or quadratic formula we need to have 0 on one side of the equation!

Practice 1

Solve:

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

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Solve:

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

First subtract 8 to get:

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

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

First subtract 8 to get:

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

Now we can use factorization:

Practice 1

Solve:

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

First subtract 8 to get:

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

Now we can use factorization:

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

so $x = 2$ or $x = -4$.

Practice 2

Solve:

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

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

We try to factorize, but it doesn't work, so we will use quadratic formula:

Practice 2

Solve:

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

We try to factorize, but it doesn't work, so we will use quadratic formula:

$$\Delta = b^2 - 4ac$$

We have $a = 1$, $b = 6$ and $c = 2$, so:

Practice 2

Solve:

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

We try to factorize, but it doesn't work, so we will use quadratic formula:

$$\Delta = b^2 - 4ac$$

We have $a = 1$, $b = 6$ and $c = 2$, so:

$$\Delta = 6^2 - 4(1)(2) = 28$$

Practice 2

Solve:

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

We try to factorize, but it doesn't work, so we will use quadratic formula:

$$\Delta = b^2 - 4ac$$

We have $a = 1$, $b = 6$ and $c = 2$, so:

$$\Delta = 6^2 - 4(1)(2) = 28$$

Now we have:

$$x = \frac{-b \pm \sqrt{\Delta}}{2a}$$

Practice 2

Solve:

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

We try to factorize, but it doesn't work, so we will use quadratic formula:

$$\Delta = b^2 - 4ac$$

We have $a = 1$, $b = 6$ and $c = 2$, so:

$$\Delta = 6^2 - 4(1)(2) = 28$$

Now we have:

$$x = \frac{-b \pm \sqrt{\Delta}}{2a}$$

so:

$$x = \frac{-6 \pm \sqrt{28}}{2} = -3 \pm \sqrt{7}$$

Practice 2

So the two solution to the equation

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

are $x = -3 + \sqrt{7}$ or $x = -3 - \sqrt{7}$.

Practice 3

Solve:

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

Practice 3

Solve:

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

We try to factorize, but it doesn't work, so we will try quadratic formula again:

Practice 3

Solve:

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

We try to factorize, but it doesn't work, so we will try quadratic formula again:

$$\Delta = b^2 - 4ac$$

We have $a = 1$, $b = -2$ and $c = 7$, so:

Practice 3

Solve:

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

We try to factorize, but it doesn't work, so we will try quadratic formula again:

$$\Delta = b^2 - 4ac$$

We have $a = 1$, $b = -2$ and $c = 7$, so:

$$\Delta = (-2)^2 - 4(1)(7) = -24$$

Practice 3

Solve:

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

We try to factorize, but it doesn't work, so we will try quadratic formula again:

$$\Delta = b^2 - 4ac$$

We have $a = 1$, $b = -2$ and $c = 7$, so:

$$\Delta = (-2)^2 - 4(1)(7) = -24$$

We have $\Delta < 0$, so there are no real solutions to the above equation.

Practice 4

Solve:

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

Practice 4

Solve:

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

We try to factorize and it works great:

Practice 4

Solve:

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

We try to factorize and it works great:

$$(x + 3)(x + 5) = 0$$

so $x = -3$ or $x = -5$.

Practice 5

Solve:

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

Practice 5

Solve:

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

We try to factorize, but it doesn't work, so we will use quadratic formula:

Practice 5

Solve:

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

We try to factorize, but it doesn't work, so we will use quadratic formula:
We have $a = 2$, $b = 4$ and $c = 1$, so:

Practice 5

Solve:

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

We try to factorize, but it doesn't work, so we will use quadratic formula: We have $a = 2$, $b = 4$ and $c = 1$, so:

$$\Delta = 4^2 - 4(2)(1) = 8$$

Practice 5

Solve:

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

We try to factorize, but it doesn't work, so we will use quadratic formula: We have $a = 2$, $b = 4$ and $c = 1$, so:

$$\Delta = 4^2 - 4(2)(1) = 8$$

so using the quadratic formula we get:

$$x = \frac{-4 \pm \sqrt{8}}{4} = -1 \pm \frac{\sqrt{2}}{2}$$

Practice 5

Solve:

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

We try to factorize, but it doesn't work, so we will use quadratic formula: We have $a = 2$, $b = 4$ and $c = 1$, so:

$$\Delta = 4^2 - 4(2)(1) = 8$$

so using the quadratic formula we get:

$$x = \frac{-4 \pm \sqrt{8}}{4} = -1 \pm \frac{\sqrt{2}}{2}$$

The two solutions to the given equation are $x = -1 + \frac{\sqrt{2}}{2}$ or $x = -1 - \frac{\sqrt{2}}{2}$.

Practice 6

Solve:

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

Practice 6

Solve:

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

We first move all terms to one side:

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

Practice 6

Solve:

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

We first move all terms to one side:

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

Now we factorize:

Practice 6

Solve:

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

We first move all terms to one side:

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

Now we factorize:

$$(x + 3)(x - 5) = 0$$

so $x = -3$ or $x = 5$.

Practice 7

Solve:

$$2x^2 + 5x = 12$$

Practice 7

Solve:

$$2x^2 + 5x = 12$$

We first move all terms to one side:

$$2x^2 + 5x - 12 = 0$$

Practice 7

Solve:

$$2x^2 + 5x = 12$$

We first move all terms to one side:

$$2x^2 + 5x - 12 = 0$$

Now we try factorization:

Practice 7

Solve:

$$2x^2 + 5x = 12$$

We first move all terms to one side:

$$2x^2 + 5x - 12 = 0$$

Now we try factorization:

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

so $x = \frac{3}{2}$ or $x = -4$.

Practice 8

Solve:

$$5x^2 = 6x$$

Practice 8

Solve:

$$5x^2 = 6x$$

We move all terms to one side:

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

Practice 8

Solve:

$$5x^2 = 6x$$

We move all terms to one side:

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

We factorize:

Practice 8

Solve:

$$5x^2 = 6x$$

We move all terms to one side:

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

We factorize:

$$x(5x - 6) = 0$$

so $x = 0$ or $x = \frac{6}{5}$.

Practice 9

Solve:

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

Practice 9

Solve:

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

We use factorization:

Practice 9

Solve:

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

We use factorization:

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

so $x = -2$.

Practice 10

Solve:

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

Practice 10

Solve:

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

We try to factorize, but it doesn't work, so we will use quadratic formula:

Practice 10

Solve:

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

We try to factorize, but it doesn't work, so we will use quadratic formula:
We have $a = 2$, $b = -1$ and $c = 1$, so:

Practice 10

Solve:

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

We try to factorize, but it doesn't work, so we will use quadratic formula: We have $a = 2$, $b = -1$ and $c = 1$, so:

$$\Delta = (-1)^2 - 4(2)(1) = -7$$

Practice 10

Solve:

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

We try to factorize, but it doesn't work, so we will use quadratic formula: We have $a = 2$, $b = -1$ and $c = 1$, so:

$$\Delta = (-1)^2 - 4(2)(1) = -7$$

We have $\Delta < 0$, so there are no real solutions to the above equation.

We will do the last three examples using "completing the square" method, so that you won't forget it. It is important as we will use it again for a different purpose when we will study quadratic functions.

Practice 11

Solve

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

Practice 11

Solve

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

We complete the square by rewriting the left hand side as:

$$(x + 4)^2 - 14 = 0$$

Practice 11

Solve

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

We complete the square by rewriting the left hand side as:

$$(x + 4)^2 - 14 = 0$$

Now we solve:

$$(x + 4)^2 = 14$$

$$x + 4 = \sqrt{14} \quad \text{or} \quad x + 4 = -\sqrt{14}$$

$$x = -4 + \sqrt{14} \quad \text{or} \quad x = -4 - \sqrt{14}$$

Practice 12

Solve

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

Practice 12

Solve

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

We divide by 2 to get:

$$x^2 + 3x + 1 = 0$$

Practice 12

Solve

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

We divide by 2 to get:

$$x^2 + 3x + 1 = 0$$

Now we complete the square by rewriting the left hand side as:

$$\left(x + \frac{3}{2}\right)^2 - \frac{5}{4} = 0$$

Practice 12

Solve

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

We divide by 2 to get:

$$x^2 + 3x + 1 = 0$$

Now we complete the square by rewriting the left hand side as:

$$\left(x + \frac{3}{2}\right)^2 - \frac{5}{4} = 0$$

Now we solve:

$$\left(x + \frac{3}{2}\right)^2 = \frac{5}{4}$$

$$x + \frac{3}{2} = \frac{\sqrt{5}}{2} \quad \text{or} \quad x + \frac{3}{2} = -\frac{\sqrt{5}}{2}$$

$$x = \frac{-3 + \sqrt{5}}{2} \quad \text{or} \quad x = \frac{-3 - \sqrt{5}}{2}$$

Practice 12

Solve

$$x^2 + 4x + 9 = 0$$

Practice 12

Solve

$$x^2 + 4x + 9 = 0$$

W complete the square by rewriting the left hand side as:

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

Practice 12

Solve

$$x^2 + 4x + 9 = 0$$

W complete the square by rewriting the left hand side as:

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

Now we try to solve:

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

But this has no real solution. No real number squared gives a negative number. So the equation has no real solutions.