Topic: Quadratic formula

Question: Use the quadratic formula to solve for the variable.

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

Answer choices:

A $x = \frac{1}{3}, 1$

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

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

D $x = 2, 3$

Solution: B

We can factor this quadratic equation directly.

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

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

So the solutions are found by setting the individual factors ($3x - 1$ and $x + 1$) to 0 and solving each of the resulting equations for x.

$$3x - 1 = 0$$

$$3x = 1$$

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

and

$$x + 1 = 0$$

$$x = -1$$

But since we've been asked to use the quadratic formula to find the solutions, we'll solve it that way. If $ax^2 + bx + c = 0$, then the quadratic formula is

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

If we compare the standard form of a quadratic equation to the equation we've been given in this problem, we see that

$$a = 3$$

$$b = 2$$

$$c = -1$$

Plugging these numbers into the quadratic formula, we get

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

$$x = \frac{-2 \pm \sqrt{4 + 12}}{6}$$

$$x = \frac{-2 \pm \sqrt{16}}{6}$$

$$x = \frac{-2 \pm 4}{6}$$

So the solutions are

$$x = \frac{-2 + 4}{6} = \frac{2}{6} = \frac{1}{3}$$

and

$$x = \frac{-2 - 4}{6} = \frac{-6}{6} = -1$$

Topic: Quadratic formula

Question: Find the solution(s) to the polynomial equation.

$$2x^2 - 7x - 3 = 0$$

Answer choices:

A $x = \frac{7 + \sqrt{73}}{4}$ and $x = \frac{7 - \sqrt{73}}{4}$

B $x = \frac{7 + \sqrt{73}}{2}$ and $x = \frac{-7 + \sqrt{73}}{2}$

C $x = \frac{-7 + \sqrt{73}}{4}$ and $x = \frac{-7 - \sqrt{73}}{4}$

D $x = \frac{7 + \sqrt{73}}{2}$ and $x = \frac{7 - \sqrt{73}}{2}$

Solution: A

Since the polynomial can't be factored, we have to use the quadratic formula,

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

to find the solutions, or roots, of the given polynomial equation. Remember that, in order to use the quadratic formula, we need our polynomial equation to be in the form

$$ax^2 + bx + c = 0$$

Our function is already in this form, so we'll first identify a, b, and c, and then plug them into the quadratic formula.

Matching up $2x^2 - 7x - 3 = 0$ with $ax^2 + bx + c = 0$, we see that

$$a = 2$$

$$b = -7$$

$$c = -3$$

Plugging these numbers into the quadratic formula, we get

$$x = \frac{-(-7) \pm \sqrt{(-7)^2 - 4(2)(-3)}}{2(2)}$$

$$x = \frac{7 \pm \sqrt{49 + 24}}{4}$$

$$x = \frac{7 \pm \sqrt{73}}{4}$$

Therefore, the roots of our equation are

$$x = \frac{7 + \sqrt{73}}{4}$$

and

$$x = \frac{7 - \sqrt{73}}{4}$$

Topic: Quadratic formula

Question: Find the roots of the equation using the quadratic formula.

$$3x^2 + 10x + 5 = 0$$

Answer choices:

A $x = \dfrac{5 \pm \sqrt{10}}{3}$

B $x = \dfrac{-5 \pm \sqrt{10}}{3}$

C $x = \dfrac{-5 \pm \sqrt{10}}{6}$

D $x = \dfrac{5 \pm \sqrt{10}}{6}$

Solution: B

Since the polynomial can't be factored, we have to use the quadratic formula,

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

to find the solutions, or roots, of the function. Remember that, in order to use the quadratic formula, we need our polynomial function in the form

$$ax^2 + bx + c = 0$$

Our function is already in this form, so we'll match it up to the form above to identify a, b and c before we plug them into the quadratic formula.

Matching up $3x^2 + 10x + 5 = 0$ with $ax^2 + bx + c = 0$, we see that

$$a = 3$$

$$b = 10$$

$$c = 5$$

Plugging these values into the quadratic formula, we get

$$x = \frac{-10 \pm \sqrt{10^2 - 4(3)(5)}}{2(3)}$$

$$x = \frac{-10 \pm \sqrt{100 - 60}}{6}$$

$$x = \frac{-10 \pm \sqrt{40}}{6}$$

$$x = \frac{-10 \pm 2\sqrt{10}}{6}$$

$$x = \frac{-5 \pm \sqrt{10}}{3}$$