Quadratic Formula Example

Math 130 *Kovitz*

Solve for x.

$$x^2 + \sqrt{5}x - 11 = 0.$$

Decide on a method of solution. Then either leave the x terms isolated on the left side (if completing the square) or set the right side to 0 (if factoring or using the quadratic formula).

Do not divide both sides by the coefficient after factoring out an x. That's definitely not correct; it is not a linear equation, so methods for solving a linear equation are not applicable.

It is always a good idea to check the solutions in the *original* equation, using a calculator if necessary.

$x^2 + \sqrt{5}x - 11 = 0.$

Factoring will not be possible with the irrational coefficient of the x term.
Completing the square does not look straightforward either, with the irrational term.
The quadratic formula might be the best method.
Set the right side of the equation to 0.

$$x = \frac{-\sqrt{5} \pm \sqrt{(\sqrt{5})^2 - 4(1)(-11)}}{2} \qquad a = 1,\ b = \sqrt{5}, \text{ and } c = -11.$$

$$= \frac{-\sqrt{5} \pm \sqrt{5 + 44}}{2} = \frac{-\sqrt{5} \pm 7}{2}.$$

$$x = \frac{-\sqrt{5} + 7}{2} \quad \text{or} \quad x = \frac{-\sqrt{5} - 7}{2}.$$

Check the answers.

Use approximate six-digit decimals. So the answers are 2.381966 and −4.618034.

$$(2.381966)^2 + \sqrt{5}\Big(2.381966\Big) - 11 = 0.000000$$

It checks.

and

$$(-4.618034)^2 + \sqrt{5}\Big(-4.618034\Big) - 11 = 0.000000$$

So, both answers check. Use of a calculator is recommended in this case, as the radical forms are messy to check because of the fractions.