1 Completing the square, quadratic formula

1.1 Warmup questions

1. Solve $x^2 + 4x + 3 = 0$.
2. Write down the formula for $(x + b)^2$.
3. Make x the subject for the following equations:
   (a) $2x + a = 0$.
   (b) $2x^2 - a = 0$.
   (c) $x^2 + 2xy + y^2 - a = 0$.

1.2 Discussion: completing the square

For a general quadratic equation $x^2 + bx + c = 0$, (e.g. $x^2 + 4x + 3 = 0$) it is not easy to make x the subject due to the presence of both the x^2 and x terms.

Questions like 3c above give us a clue as to how we could proceed: if we are able to use special quadratic formulas to factorize our quadratics into perfect squares, we could potentially make x the subject.

Let $y = 2$ and $a = 1$ in question 3c and see what we end up with.

We will wrap up with a discussion on how this method can be generalized.

2 Answers

1. $x = -3$ or $x = -1$.
2. $x^2 + 2bx + b^2$.
3. (a) $x = -\frac{a}{2}$.
   (b) $x = \pm\sqrt{\frac{a}{2}}$.
   (c) $x = -y \pm \sqrt{a}$.