NCEA Level 2 Mathematics (Homework)
8. The Quadratic Formula

Reading

Go and watch...

`https://www.youtube.com/watch?v=v-pyuaThp-c`

What's it good for?

People use quadratic equations for...

- Engineering, economics, and the sciences: modelling situations (a perfect projectile follows a parabolic arc, a parabolic mirror reflects all light from the focus into parallel rays and is used in telescopes and radio dishes...)
- Mathematics: every polynomial is a product of quadratic and linear factors, and the fact that the quadratic formula even exists is actually quite surprising (there is no equivalent to 'completing the square' for cubics or anything more complicated).

Questions

1. Find the nature of the roots of the equation $x^2 + 3kx - 28$, if:
   (a) $k < 0$,
   (b) $k = 0$, and
   (c) $k > 0$.
2. Find the values of m for which one root of the equation $4x^2 = mx - 5$ is thrice the other root.
3. Suppose the quadratic equation $x^2 + bx + c = 0$ has the two roots α and β. Show that $bc = -\alpha^2\beta - \alpha\beta^2$.
4. The lengths of three sides of a right-angled triangle are $x - 2$, $2x$, and $x + 6$. If it is known that the length of the longest side is $x + 6$, compute x and give the length of the shortest side explicitly.