# Exercise 8

($a$) Prove that the usual formula solves the quadratic equation

$$az^2 + bz + c = 0 \qquad (a \neq 0)$$

when the coefficients $a$, $b$, and $c$ are complex numbers. Specifically, by completing the square on the left-hand side, derive the *quadratic formula*

$$z = \frac{-b + (b^2 - 4ac)^{1/2}}{2a},$$

where both square roots are to be considered when $b^2 - 4ac \neq 0$,

($b$) Use the result in part ($a$) to find the roots of the equation $z^2 + 2z + (1 - i) = 0$.

$$Ans. \left(-1 + \frac{1}{\sqrt{2}}\right) + \frac{i}{\sqrt{2}}, \quad \left(-1 - \frac{1}{\sqrt{2}}\right) - \frac{i}{\sqrt{2}}.$$

[A period is needed here instead.]