1 PQFormula

Let $a, b \in \mathbb{R}$ and $a \neq 0$. Please solve the following quadratic equations.

1. $x^2 + bx - 2b^2 = 0$
2. $3a^2x^2 + 4ax + 1 = 0$
3. $ax^2 + ax + x + 1 = 0$

Solution:

Formula

$$x_{1,2} = -\frac{p}{2} \pm \sqrt{\left(\frac{p}{2}\right)^2 - q}$$

1.

$$x_{1,2} = -\frac{b}{2} \pm \sqrt{\left(\frac{b}{2}\right)^2 + 2b^2} =$$
$$-\frac{b}{2} \pm \sqrt{\frac{b^2 + 8b^2}{4}} = -\frac{b}{2} \pm b\frac{3}{2} = \begin{cases} b \\ -2b \end{cases}$$

2.

$$x_{1,2} = \begin{cases} -\frac{1}{3a} \\ -\frac{1}{a} \end{cases}$$

3.

$$x_{1,2} = \begin{cases} -\frac{1}{a} \\ -1 \end{cases}$$