Quadratic formula

6 questions | 18 marks

Equivalent correct methods earn the corresponding marks.

1. Use the formula to solve $2x^2 + 3x - 1 = 0$ exactly. [3 marks]

$a = 2, b = 3, c = -1$, so $b^2 - 4ac = 17$.

Answer: $x = \frac{-3 \pm \sqrt{17}}{4}$

2. Solve $3x^2 + 4x - 2 = 0$ exactly. [3 marks]

$x = \frac{-4 \pm \sqrt{40}}{6} = \frac{-2 \pm \sqrt{10}}{3}$.

Answer: $x = \frac{-2 \pm \sqrt{10}}{3}$

3. Solve $x^2 - 5x + 3 = 0$ exactly. [3 marks]

$b^2 - 4ac = 25 - 12 = 13$.

Answer: $x = \frac{5 \pm \sqrt{13}}{2}$

4. Solve $4x^2 - 4x - 1 = 0$ exactly. [3 marks]

$x = \frac{4 \pm \sqrt{32}}{8} = \frac{4 \pm 4\sqrt{2}}{8}$.

Answer: $x = \frac{1 \pm \sqrt{2}}{2}$

5. Solve $x^2 - 6x + 2 = 0$. Give both answers to three decimal places. [3 marks]

$x = 3 \pm \sqrt{7}$.

Using $\sqrt{7} \approx 2.645751$, round each final root.

Answer: $x \approx 0.354$ or $x \approx 5.646$

6. A student writes the roots of $x^2 + 5x - 2 = 0$ as $(5 \pm \sqrt{33})/2$. Correct the answer and explain the error. [3 marks]

Here $b = 5$, so $-b = -5$.

The discriminant $25 + 8 = 33$ is correct.

Answer: $x = \frac{-5 \pm \sqrt{33}}{2}$; the numerator starts with $-b$.