Answers: Using the quadratic formula

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Summary

Answers to questions relating to the guide on using the quadratic formula.

*These are the answers to* [*Questions: Using the quadratic formula*](../questions/qs-quadraticformula.qmd)*.*

**Please attempt the questions before reading these answers!**

## Answers

### Q1

1.1. The two roots of $x^{2}−7x+6=0$ are $x=1$ and $x=6$.

1.2. The two roots of $x^{2}+14x+45=0$ are $x=−9$ and $x=−5$.

1.3. The two roots of $x^{2}−4x+13=0$ are $x=2−3i$ and $x=2+3i$.

1.4. The two roots of $x^{2}−x−56=0$ are $x=−7$ and $x=8$.

1.5. The one distinct root of $s^{2}+4s+4=0$ is $x=−2$.

1.6. The two roots of $t^{2}+4t−4=0$ are $t=−2−2\sqrt{2}$ and $t=−2+2\sqrt{2}$

1.7. The two roots of $m^{2}−144=0$ are $m=−12$ and $m=12$.

1.8. The two roots of $5c^{2}−25+30=0$ are $c=−1$ and $c=1$.

1.9. The two roots of $2n^{2}+n+1=0$ are $n=\frac{−1−i\sqrt{7}}{4}$ and $n=\frac{−1+i\sqrt{7}}{4}$

1.10. The two roots of $−3c^{2}+9c−1=0$ are $c=\frac{3}{2}−\frac{\sqrt{69}}{6}$ and $c=\frac{3}{2}+\frac{\sqrt{69}}{6}$.

1.11. The two roots of $\frac{x^{2}}{2}−\frac{7x}{2}+3=0$ are $x=1$ and $x=6$.

1.12. The one distinct root of $e^{2x}−4e^{x}+4=0$ is $e^{x}=2$, giving $x=ln\left(2\right)$ as a solution.

1.13. The two roots of $−9s^{2}+3s−1=0$ are $s=\frac{1−i\sqrt{3}}{6}$ and $s=\frac{1+i\sqrt{3}}{6}$.

1.14. The two roots of $2e^{6x}+e^{3x}+1=0$ are $e^{3x}=\frac{−1−i\sqrt{7}}{4}$ and $e^{3x}=\frac{−1+i\sqrt{7}}{4}$, and so there are no real solutions for $x$.

1.15. The one distinct root of $cos^{2}\left(x\right)+4cos\left(x\right)−4=0$ is $cos\left(x\right)=2$, and so there are no real solutions for $x$ as $−1\leq cos\left(x\right)\leq 1$ for all real $x$.

1.16. The two distinct roots of $8m^{2}−4m−1=0$ are $m=\frac{1−\sqrt{3}}{4}$ and $m=\frac{1+\sqrt{3}}{4}$

### Q2

In [Questions: Introduction to quadratic equations](../questions/qs-introtoquadratics.qmd), you saw that the following expressions are all quadratic equations in disguise. Solve these for the variable indicated.

2.1. The two roots of $x=1/x−1$ are $x=\frac{−1−\sqrt{5}}{2}$ and $x=\frac{−1+\sqrt{5}}{2}$.

2.2. The two roots of $\left(y−1\right)\left(y−4\right)=−\left(y+2\right)\left(y+3\right)$ are $y=−i\sqrt{5}$ and $y=i\sqrt{5}$.

2.3. The one distinct root of $4m\left(m+1\right)+6=5$ is $m=−1/2$.

2.4. The two roots of $\left(t−1\right)\left(t+1\right)=−2$ are $t=−i$ and $t=i$.

2.5. The two roots of $\frac{x−1}{x−2}=5x$ are $x=\frac{11−\sqrt{101}}{10}$ and $x=\frac{11+\sqrt{101}}{10}$.

2.6. The two solutions in $e^{x}$ for $\frac{e^{x}−e^{−x}}{2}=1$ are $e^{x}=1−\sqrt{2}$ and $e^{x}=1+\sqrt{2}$. Of these, $x=ln\left(1+\sqrt{2}\right)$ is a valid solution in $x$, as $e^{x}$ cannot be negative.

## Version history and licensing

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