Quadratic Formula Review

If you just need a numeric approximation to the solution of a quadratic equation, using a programmable calculator to automatically compute and simplify the quadratic formula is convenient. If you don't already have the quadratic formula programmed into your calculator, follow the directions below.

COMMAND	**COMMENTS**
Press PRGM	*Brings up the Program Menu: EXEC EDIT NEW*
Arrow over to the NEW menu and choose 1: Create New	*Use EDIT to edit an existing program*
Type QF (or whatever name you choose) using the ALPHA key and press ENTER*	*Names the program QF. Other names are fine too.*
:ClrHome	*PRGM → I/O menu→ 8. Clears the home screen.*
:a+b*i*	*MODE → a+bi. Sets the calculator to Complex mode in case you have non-real solutions.*
:Prompt A,B,C	*PRGM → I/O → 2 for "Prompt". Will prompt the user for A, B and C. You'll always type A, B, and C with the ALPHA key (as well as D, P, and Q later).*
:$(B^2 - 4AC) \to D$	*Calculates the discriminant. Use the STO button for the arrow.*
:$(-B + \sqrt{D}))/(2A) \to P$	*Calculates the first root*
: $(-B - \sqrt{D}))/(2A) \to Q$	*Calculates the second root.*
:Disp ROOTS, P ▷ Frac ,Q ▷ Frac	*PRGM → I/O → 3 for "Disp". Use ALPHA to type "ROOTS". Use MATH→1 for " ▷ Frac". Displays the two roots (as fractions if applicable).*

*Now you're in the program. You'll also need to press ENTER after each line you program.

Example run

We'll use the example equation $2x^2 = 9(x + 2)$.

First we rewrite in standard form: $2x^2 - 9x - 18 = 0$.

Then we identify the coefficients: $A = 2, B = -9, C = -18$.

Now run the program. Use PRGM→EXEC→ choose your QF program. Press ENTER.

Type in your A, B, and C values as prompted, pressing ENTER after each.

Your calculator should then output the two solutions, 6 and -3/2.

If you press ENTER again immediately, your calculator will run a fresh version of the program (good if you're doing a bunch of quadratic formula problems in a row).

Example run 2

For the equation $x^2 - 2x + 2 = 0$, identify that $A = 1, B = -2, C = 2$

Run the program to obtain the solutions $1 + i$ and $1 - i$.

Use algebra to write the equation in standard form ($ax^2 + bx + c = 0$), and then use your program to solve.

1) $x^2 + x = 42$	**2)** $x^2 + 10 = 11x$
3) $t^2 + 8 = 4t$	**4)** $2x(x - 5) = 12$
5) $2x^2 + 3 = 2(x - x^2) + 10$	**6)** $\frac{5x}{x^2+1} = 2$
7) $(x + 3)(3x + 5) = 7$	**8)** $(x + 3)(x - 2) = 50$
9) $9x^2 = \frac{5(x+1)}{2} + 2x$	**10)** $x^2 = 4x - 53$
11) $\sqrt{x + 4} = x - 2$	**12)** $\sqrt{x + 7} = x + 1$
13) $2 + \sqrt{2x - 1} = x$	**14)** $4 + \sqrt{2x^2 - 8} = 0$
15) $4x(x - 1) + 1 = 0$	

In standard form:

1) $1x^2 + 1x - 42 = 0$	**2)** $1x^2 - 11x + 10 = 0$
3) $1t^2 - 4t + 8 = 0$	**4)** $2x^2 - 10x - 12 = 0$
5) $4x^2 - 2x - 7 = 0$	**6)** $2x^2 - 5x + 2 = 0$
7) $3x^2 + 14x + 8 = 0$	**8)** $1x^2 + 1x - 56 = 0$
9) $18x^2 - 9x - 5 = 0$	**10)** $1x^2 - 4x + 53 = 0$
11) $1x^2 - 5x + 0 = 0$	**12)** $1x^2 + 1x - 6 = 0$
13) $1x^2 - 6x + 5 = 0$	**14)** $2x^2 + 0x - 24 = 0$
15) $4x^2 - 4x + 1 = 0$	

Warning: Don't forget to check solutions to radical equations in the **original** equation.

Solutions:

1) $x = -7, 6$	**2)** $x = 1, 10$
3) $t = 2 \pm 2i$	**4)** $x = -1, 6$
5) $x \approx -1.10, 1.60$	**6)** $x = \frac{1}{2}, 2$
7) $x = -4, -\frac{2}{3}$	**8)** $x = -8, 7$
9) $x = \frac{5}{6}, -\frac{1}{3}$	**10)** $x = 2 \pm 7i$
11) $x = 5$ only	**12)** $x = 2$ only
13) $x = 5$ only	**14)** no solution
15) $x = \frac{1}{2}$	