Programming the Quadratic Formula into the TI-83/84   **Name**

For those times when a numeric approximation to the solution of a quadratic equation will suffice, using a programmable calculator to automatically compute and simplify the quadratic formula is rather convenient. Since we shall expand upon the programmable features of the TI-83/84 throughout the course this is a good starting point. $\circlearrowleft$ = ENTER

COMMAND	**COMMENTS**
Press PRGM	*Brings up the Program Menu: EXEC EDIT NEW*
Select NEW $\circlearrowleft$	*Use EDIT to edit an existing program*
Name = QF $\circlearrowleft$	*Names the program QF. Other names will also suffice.*
:ClrHome $\circlearrowleft$	PRGM $\rightarrow$ I/O $\rightarrow$ 8. *Clears the home screen.*
:a+bi $\circlearrowleft$	MODE $\rightarrow$ a+bi. *Sets the TI-83+ to Complex mode.*
:Disp "SOLVES Ax^2 + Bx + C = 0" $\circlearrowleft$	PRGM $\rightarrow$ I/O $\rightarrow$ 3. *Displays message on the screen.*
:Prompt A,B,C $\circlearrowleft$	PRGM $\rightarrow$ I/O $\rightarrow$ 2. *Will prompt the user for A, B and C*
:(B^2−4AC) $\rightarrow$D $\circlearrowleft$	*Calculates the Discriminant*
:(-B+√(D))/(2A)$\rightarrow$P $\circlearrowleft$	*Calculates the first root*
:(-B−√(D))/(2A)$\rightarrow$Q $\circlearrowleft$	*Calculates the second root.*
:Disp "ROOTS",P ▶Frac ,Q ▶Frac $\circlearrowleft$	PRGM $\rightarrow$ I/O $\rightarrow$ 3. *Displays the two roots.*

Now let's run the program. Use PGRM $\rightarrow$ EXEC $\rightarrow$ *Select Program* $\circlearrowleft$. Note: For these examples, MODE was preset to FLOAT accuracy.

Example 1   Solve $2x^2 = 9(x + 2)$

Rewrite in Standard Form: $2x^2 − 9x − 18 = 0$ We identify A = 2, B = -9 and C = -18 PGRM $\rightarrow$ EXEC $\rightarrow$ QF $\circlearrowleft$

```
SOLVES AX²+BX+C…   A=?2
                   B=?-9
A=?2               C=?-18
B=?-9              ROOTS
C=?-18■
                               6
                            -3/2
                ■          Done
```

Note: Pressing ENTER at the conclusion of a program will rerun a fresh version of the program.

Example 2   Solve $x^2 + 2 = 2x$

Rewrite in Standard Form: $x^2 − 2x + 2 = 0$ We identify A = 1, B = -2 and C = 2 PGRM $\rightarrow$ EXEC $\rightarrow$ QF $\circlearrowleft$

```
SOLVES AX²+BX+C…   A=?1
                   B=?-2
A=?1               C=?2
B=?-2              ROOTS
C=?2■
                            1+i
                            1-i
                ■          Done
```

Extra Credit: Use <u>algebra</u> to write the equation in standard quadratic form ($ax^2 + bx + c = 0$). Then use the Quadratic Formula program to solve the equation.

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. $\dfrac{5x}{x^2 + 1} = 2$

7. $(x + 3)(3x + 5) = 7$

8. $(x + 3)(x - 2) = 50$

9. $9x^2 = \dfrac{5(x + 1)}{2} + 2x$

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. $4x(x - 1) + 1 = 0$

16. $1 + \sqrt{x^2 - 2x + 1} = x$