

## Solving Quadratic Functions

*by factoring or completing the square*

### Solve for the roots or zeros of the function

For each function, first factor it (always show this step), then state the roots using the form, " $x = 3, 4$  (or whatever the values are).

1.  $f(x) = x^2 + 7x + 12$

2.  $f(x) = x^2 + 13x + 12$

3.  $f(x) = x^2 - 4x - 12$

4.  $f(x) = 2x^2 - 10x - 12$

5.  $f(x) = -3x^2 + 6x - 3$

6.  $f(x) = \frac{1}{2}x^2 + 2x + 2$

## Completing the square

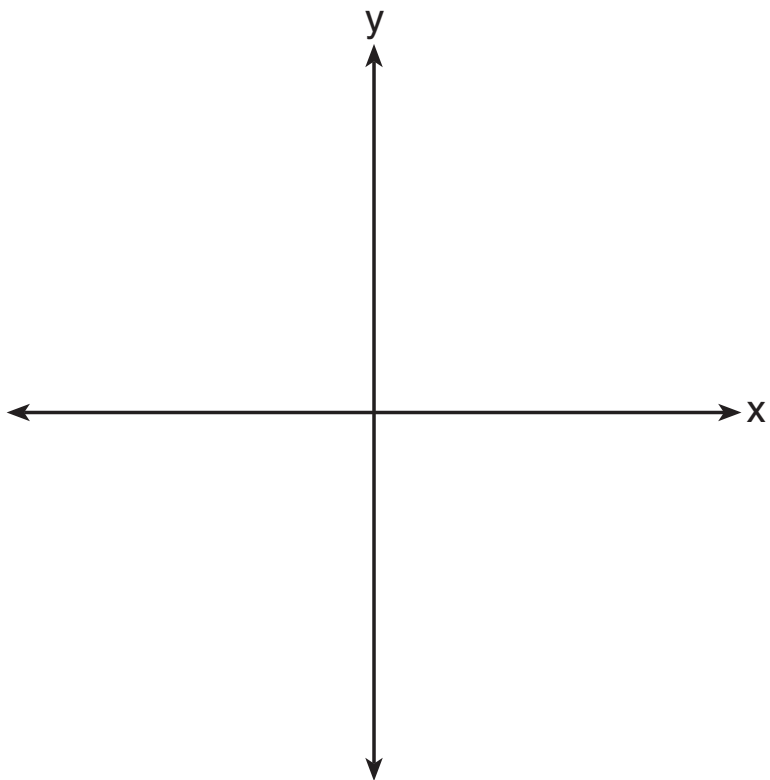
Complete the square.

7.  $f(x) = x^2 - 6x + 11$

8.  $f(x) = x^2 + 8x + 9$

Expand from vertex form to standard form,  $ax^2 + bx + c$  where  $a, b, c \in \mathbb{R}$ . Then factor the result and state the roots. Sketch the function, labeling the intercepts' values and vertex as an ordered pair.

9.  $f(x) = (x - 2)^2 - 9$



### Function substitution

10. Given  $f(x) = 3x + 2$ . What is  $f(2x - 1)$ ?

(a) Perform the substitution, putting  $2x - 1$  in parenthesis.

(b) Simplify, beginning each line with a leading equals sign if it is equal to the line above.

11. Given  $f(x) = 3x + 2$ . What is the inverse of the function  $f^{-1}(x)$ ?

(a) Rewrite the function reversing  $x$  and  $y$ . (assume that  $y$  and  $f(x)$  are interchangeable)

(b) Solve for  $x$ . Finish by putting  $y$  on the left side of the equality.

(c) State the answer as  $f^{-1}(x)$  equals an expression.