**FINDING ZEROS** Because a zero of a function is an $x$-intercept of the function's graph, you can use the function's graph to find the zeros of a function.

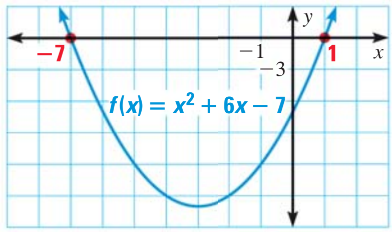
## EXAMPLE 4 Find the zeros of a quadratic function

**Find the zeros of $f(x) = x^2 + 6x - 7$.**

**ANOTHER WAY**
You can find the zeros of a function by factoring:
$f(x) = x^2 + 6x - 7$
$0 = x^2 + 6x - 7$
$0 = (x + 7)(x - 1)$
$x = -7$ *or* $x = 1$

**Solution**

Graph the function $f(x) = x^2 + 6x - 7$. The $x$-intercepts are $-7$ and 1.




▶ The zeros of the function are $-7$ and 1.

**CHECK** Substitute $-7$ and 1 in the original function.

$f(-7) = (-7)^2 + 6(-7) - 7 = 0$ ✓

$f(1) = (1)^2 + 6(1) - 7 = 0$ ✓

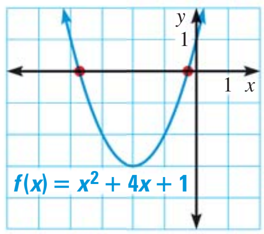
**APPROXIMATING ZEROS** The zeros of a function are not necessarily integers. To approximate zeros, look at the signs of the function values. If two function values have opposite signs, then a zero falls between the $x$-values that correspond to the function values.

## EXAMPLE 5 Approximate the zeros of a quadratic function

**Approximate the zeros of $f(x) = x^2 + 4x + 1$ to the nearest tenth.**

**Solution**

**STEP 1** **Graph** the function $f(x) = x^2 + 4x + 1$. There are two $x$-intercepts: one between $-4$ and $-3$ and another between $-1$ and 0.




**STEP 2** **Make** a table of values for $x$-values between $-4$ and $-3$ and between $-1$ and 0 using an increment of 0.1. Look for a change in the signs of the function values.

**INTERPRET FUNCTION VALUES**
The function value that is closest to 0 indicates the $x$-value that best approximates a zero of the function.

| $x$ | −3.9 | −3.8 | **−3.7** | −3.6 | −3.5 | −3.4 | −3.3 | −3.2 | −3.1 |
|---|---|---|---|---|---|---|---|---|---|
| $f(x)$ | 0.61 | 0.24 | **−0.11** | −0.44 | −0.75 | −1.04 | −1.31 | −1.56 | −1.79 |

| $x$ | −0.9 | −0.8 | −0.7 | −0.6 | −0.5 | −0.4 | **−0.3** | −0.2 | −0.1 |
|---|---|---|---|---|---|---|---|---|---|
| $f(x)$ | −1.79 | −1.56 | −1.31 | −1.04 | −0.75 | −0.44 | **−0.11** | 0.24 | 0.61 |

▶ In each table, the function value closest to 0 is $-0.11$. So, the zeros of $f(x) = x^2 + 4x + 1$ are about $-3.7$ and about $-0.3$.

### ✓ GUIDED PRACTICE for Examples 4 and 5

**4.** Find the zeros of $f(x) = x^2 + x - 6$.

**5.** Approximate the zeros of $f(x) = -x^2 + 2x + 2$ to the nearest tenth.