# Exercise 83

For the following exercises, for each polynomial, a. find the degree; b. find the zeros, if any; c. find the $y$-intercept(s), if any; d. use the leading coefficient to determine the graph's end behavior; and e. determine algebraically whether the polynomial is even, odd, or neither.

$$f(x) = 2x^2 - 3x - 5$$

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**Solution**

## Part (a)

The degree of the polynomial is 2 because the highest power of $x$ is 2.

## Part (b)

Set $f(x) = 0$.

$$f(x) = 2x^2 - 3x - 5 = 0$$

Factor the polynomial.

$$(2x - 5)(x + 1) = 0$$

Use the zero product property.

$$2x - 5 = 0 \quad \text{or} \quad x + 1 = 0$$

Solve each equation for $x$.

$$2x = 5 \quad \text{or} \quad x = -1$$

$$x = \frac{5}{2}$$

Therefore, the zeros are

$$x = \left\{-1, \frac{5}{2}\right\}.$$

## Part (c)

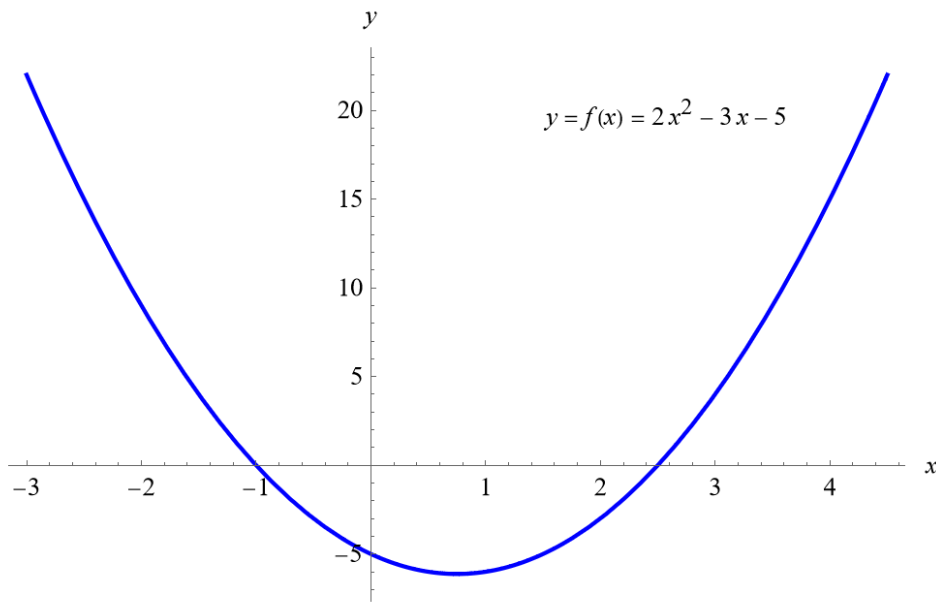
$y$-intercepts are the points where the function touches the $y$-axis, which occurs when $x = 0$.

$$f(0) = 2(0)^2 - 3(0) - 5 = -5$$

Therefore, there's one $y$-intercept: $(0, -5)$.

**Part (d)**

$2x^2$ is the dominant term in the polynomial, so the graph is in the shape of a parabola. Since the coefficient is +2, it opens upward towards the positive $y$-axis. The graph of $f(x)$ versus $x$ below illustrates this.




**Part (e)**

Plug in $-x$ for $x$ in the function.

$$\begin{aligned} f(-x) &= 2(-x)^2 - 3(-x) - 5 \\ &= 2x^2 + 3x - 5 \end{aligned}$$

Since $f(-x) \neq f(x)$, the function $f(x)$ is not even.

Since $f(-x) \neq -f(x)$, the function $f(x)$ is not odd.