

A *polynomial function* is a function of the form

$$f(x) = a_n x^n + a_{n-1} x^{n-1} + \cdots + a_1 x + a_0,$$

where  $a_i \in \mathbb{R}$  and  $a_n \neq 0$ . The *degree* of  $f(x)$  is  $\deg(f) = n$ . The real numbers  $a_i$  are the *coefficients* of  $f(x)$ . The *leading coefficient* of  $f(x)$  is  $a_n$ . The *constant coefficient* of  $f(x)$  is  $a_0$ .

The *zeros* of  $f(x)$  are the *real* and *complex* solutions to the equation  $f(x) = 0$ .

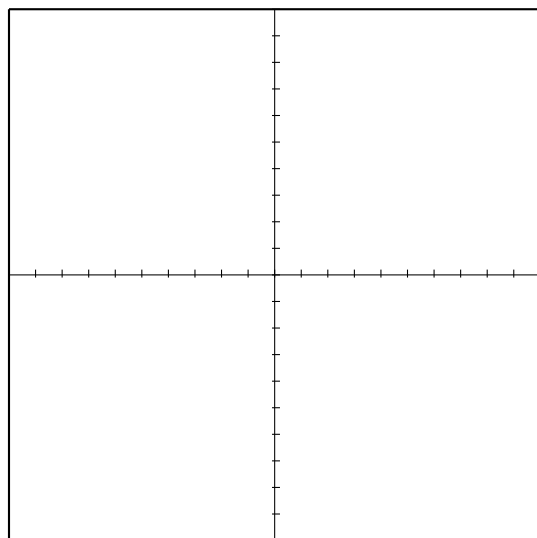
The *y-intercept* of  $f(x)$  is the point  $(0, a_0)$ .

The *x-intercepts* of  $f(x)$  are the points  $(r, 0)$ , where  $r$  is a *real* zero of  $f(x)$ .

The *end behavior* of  $f(x)$ , which determines the behavior of the function near  $\pm\infty$ , is

- (a)  $++$  if  $n$  is even and  $a_n > 0$ ;
- (b)  $--$  if  $n$  is even and  $a_n < 0$ ;
- (c)  $-+$  if  $n$  is odd and  $a_n > 0$ ;
- (d)  $+-$  if  $n$  is odd and  $a_n < 0$ .

Find the degree, leading coefficient, constant coefficient, zeros, intercepts, and shape of the function  $f$ . Use the intercepts and the shape to sketch the graph of the equation  $y = f(x)$ .



**Polynomial:**  $f(x) = \sqrt{5} - 2$

**Degree:**

**Leading Coefficient:**

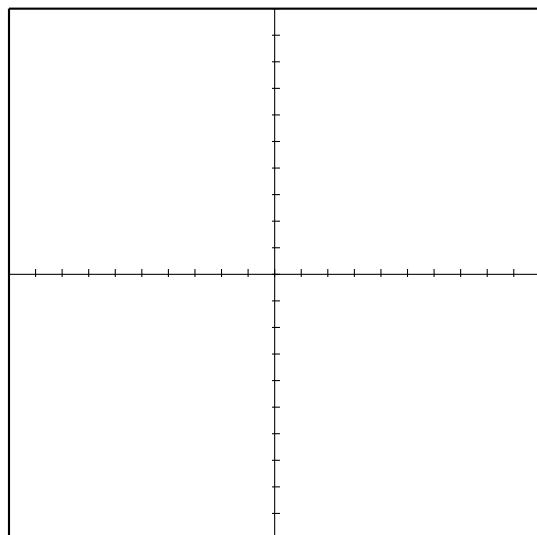
**Constant Coefficient:**

**Zeros:**

**y-intercept:**

**x-intercepts:**

**End Behavior:**



**Polynomial:**  $f(x) = 8 - 2x^2$

**Degree:**

**Leading Coefficient:**

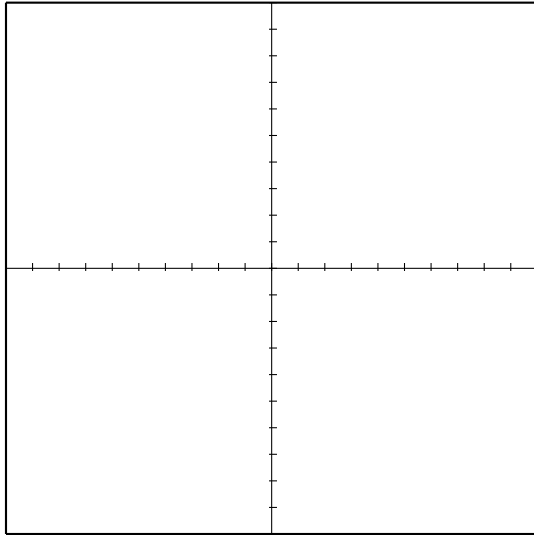
**Constant Coefficient:**

**Zeros:**

**y-intercept:**

**x-intercepts:**

**End Behavior:**



**Polynomial:**  $f(x) = 7 + 8x - 3x^2$

**Degree:**

**Leading Coefficient:**

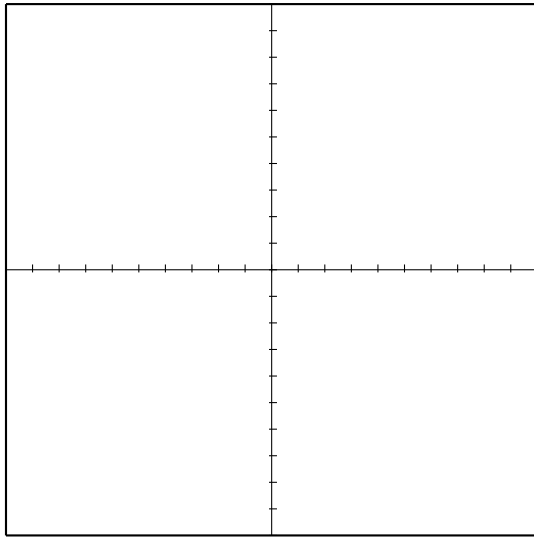
**Constant Coefficient:**

**Zeros:**

***y*-intercept:**

***x*-intercepts:**

**End Behavior:**



**Polynomial:**  $f(x) = x^3 - 9x$

**Degree:**

**Leading Coefficient:**

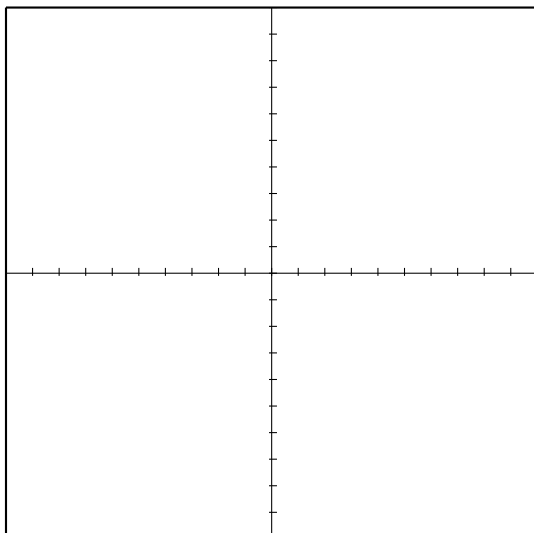
**Constant Coefficient:**

**Zeros:**

***y*-intercept:**

***x*-intercepts:**

**End Behavior:**



**Polynomial:**  $f(x) = x^3 - 2x^2 - 4x + 8$

**Degree:**

**Leading Coefficient:**

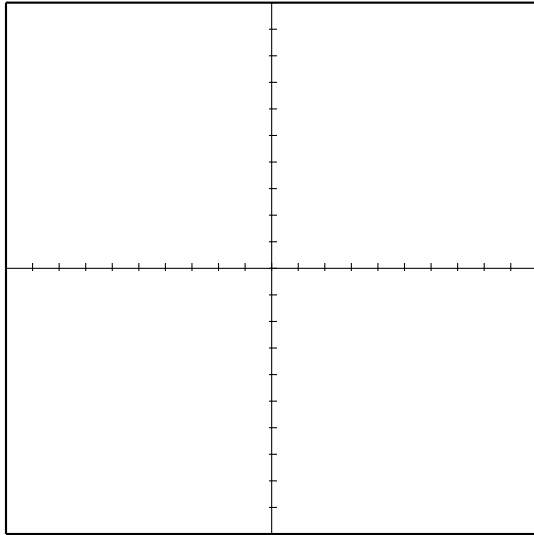
**Constant Coefficient:**

**Zeros:**

***y*-intercept:**

***x*-intercepts:**

**End Behavior:**



**Polynomial:**  $f(x) = x^4 - 10x^2 + 9$

**Degree:**

**Leading Coefficient:**

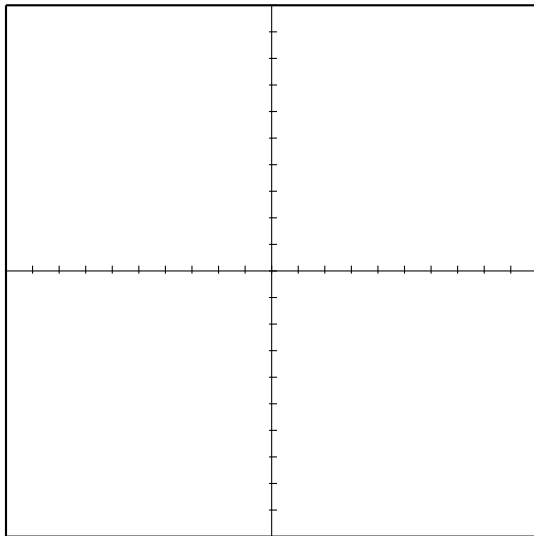
**Constant Coefficient:**

**Zeros:**

***y*-intercept:**

***x*-intercepts:**

**End Behavior:**



**Polynomial:**  $f(x) = x^4 - 5x^3 - 3x^2 + 17x - 10$

**Degree:**

**Leading Coefficient:**

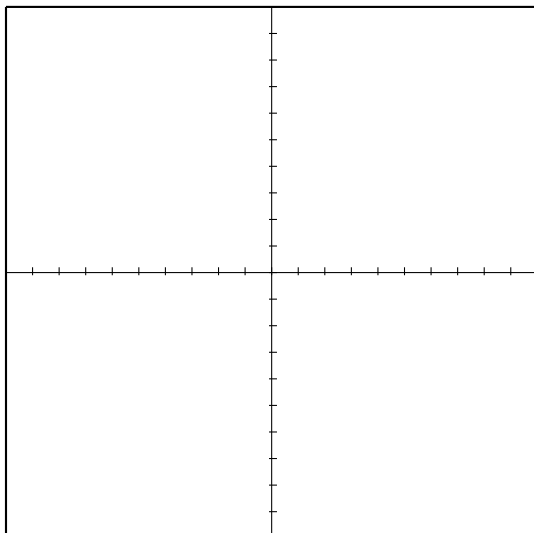
**Constant Coefficient:**

**Zeros:**

***y*-intercept:**

***x*-intercepts:**

**End Behavior:**



**Polynomial:**  $f(x) = 6x^3 - 11x^2 - 24x + 9$

**Degree:**

**Leading Coefficient:**

**Constant Coefficient:**

**Zeros:**

***y*-intercept:**

***x*-intercepts:**

**End Behavior:**