**Activity 1.3.5 Even and Odd Functions**

1. Graph each function on your graphing calculator, then sketch the graph on the axes below.

|  |  |
| --- | --- |
| a. $f\left(x\right)=x$ | b. $f\left(x\right)=x^{2}$ |
| c. $f\left(x\right)=x^{3}$ | d. $f\left(x\right)=x^{4}$ |
| e. $f\left(x\right)=x^{5}$ | f. $f\left(x\right)=x^{2}+x$ |
| g. $f\left(x\right)=x^{3}-x$ | h. $f\left(x\right)=x^{4}-x^{2}$ |

1. Sort each function into three groups according to whether the function is (a) symmetric to the *y*-axis, (b) symmetric about the origin, or (c) neither.

|  |  |  |
| --- | --- | --- |
| **Symmetric to*****y*–axis** | **Symmetric about** **Origin** | **Neither** |
|  |  |  |

1. What are some observations about each group in the chart?

|  |  |  |
| --- | --- | --- |
| **Symmetric to*****y*–axis** | **Symmetric about****Origin** | **Neither** |
|  |  |  |

1. Evaluate $f\left(-x\right)$ for the functions above.
2. What is true for all functions with even powers of *x* when you evaluate them at $-x$?
3. What is true for all functions with odd powers of *x* when you evaluate them at $-x$?

**Summary:**

You should have observed that functions with only even powers of *x* have the property that $f\left(-x\right)=f(x)$. A function that has the property $f\left(-x\right)=f(x)$ for all values of *x* is called an *even function*.

You should have observed that functions with only odd powers of *x* have the property that $f\left(-x\right)=-f(x)$. A function that has the property $f\left(-x\right)=-f(x)$ for all values of *x* is called an *odd function*.

While the names even function and odd function come from how functions work when they have only even or only odd exponents, it is important to know that other types of functions can be even functions or odd functions. You will discover some of these later in Algebra 2.