College/Alg Trig  **2.2 Even and Odd Functions** Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

*We can classify the graphs of functions as either even, odd, or neither.*

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| **Even** | **Odd** |
| A function is an even function if \_\_\_\_\_\_\_\_\_\_\_\_\_for all x in the domain of f.\*The right side of the equation of an even function does NOT change if x is replaced with –x. Even functions are symmetric with respect to the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. This means we could fold the graph on the axis, and it would line up perfectly on both sides! | A function is an odd function if \_\_\_\_\_\_\_\_\_\_\_\_\_\_for all x in the domain of f.\*Every term on the right side of the equation changes signs if x is replaced with –x.Odd functions are symmetric with respect to the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. This means we can flip the image upside down and it will appear exactly the same! |

**If we cannot classify a function as even or odd, then we call it neither!**

**Directions:** Determine graphically using possible symmetry, whether the following functions are even, odd, or neither.

|  |  |  |
| --- | --- | --- |
| 1. [image] | 2. [image] | 3. [image] |
| 4. [image] | 5. [image] | 6. [image] |

To verify algebraically if a function is even, odd, or neither, we must prove one of the following.

**For even prove: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ For odd prove: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**If neither of the above are true, we call the function neither!**

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| **Function Notation** | **What to do** | **Example.** |
| $$f(x)$$ | Repeat the original function.  | $$f\left(x\right)=x^{2}+3x+5$$ |
| $$f(-x)$$ | Plug in a \_\_\_\_\_\_\_\_ for every x and simplify! | $$f\left(x\right)=x^{2}+3x+5$$ |
| $$-f(x)$$ | Change every sign you see in $f(x)$. If something starts positive, it changes to negative and if it starts negative, it changes to a positive.  | $$f\left(x\right)=x^{2}+3x+5$$ |

**Directions:** Verify algebraically whether each function is even, odd, or neither!

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| 1. $f\left(x\right)=x^{3}-6x$  |
| 2. $g\left(x\right)=x^{4}-2x^{2}$ |
| 3.$ h\left(x\right)=x^{2}+2x+1$ |
| 4. $f\left(x\right)=x^{2}+6$  |
| 5. $g\left(x\right)=7x^{3}-x$  |
| 6. $h\left(x\right)=x^{5}+1$ |
| 7. $f\left(x\right)=x\sqrt{4-x^{2}}$ |
| 8. $g\left(x\right)=x^{4}\sqrt{1+x}$ |
| 9. $h\left(x\right)=\left|x\right|-1$ |
| 10. $g\left(x\right)=\frac{1}{4}x^{6}-5x^{2}$ |