

Name _____

Honors Algebra II

Unit 4 – Polynomial Functions (Graphing)

WS – Function Symmetry Practice

For the following, determine whether the function's symmetry is even, odd, or neither and how that relates to the graph. Show your work!

1. $f(x) = 3x^4 - 6x^2$

2. $f(x) = x^3 - 3x^2 + 2$

3. $f(x) = -x^6 - 2x^4$

4. $f(x) = x^4 - 2x^2 + 3$

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

6. $f(x) = x^4 + x^3 - 3x^2$

7. $f(x) = x^3 - 8x$

8. $f(x) = 2x^3 - 3x^2 - 12x$

9. $f(x) = -x^2 - 8$

10. $f(x) = 1 - 5x^2 - 3x^4$

11. $f(x) = x^2 - 4x$

12. $f(x) = -2x^3 - 7x + 6$

1. $f(x) = 3x^4 - 6x^2 \Rightarrow$ even? $f(-x) = ?$

$$f(-x) = 3(-x)^4 - 6(-x)^2$$
$$= 3x^4 - 6x^2$$

$f(-x) = f(x)$, so $f(x)$ has even symmetry
symmetric over y-axis

2. $f(x) = x^3 - 3x^2 + 2 \Rightarrow$ odd? $f(-x) = -f(x)$

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

$f(-x) \neq -f(x)$ and $f(-x) \neq f(x) = f(x)$
has neither even nor odd symmetry
no symmetry

3. $f(x) = -x^6 - 2x^4 \Rightarrow$ even? $f(-x) = ?$

$$f(-x) = -(-x)^6 - 2(-x)^4$$
$$= -x^6 - 2x^4$$

$f(-x) = f(x)$, so $f(x)$ has even symmetry
symmetric over y-axis

4. $f(x) = x^4 - 2x^2 + 3 \Rightarrow$ even? $f(-x) = ?$

$$f(-x) = (-x)^4 - 2(-x)^2 + 3$$
$$= x^4 - 2x^2 + 3$$

$f(-x) = f(x)$, so $f(x)$ has even symmetry
symmetric over y-axis

5. $f(x) = x^3 - 3x^2 + 5 \Rightarrow$ odd? $f(-x) = -f(x)$

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

$f(-x) \neq -f(x)$ and $f(-x) \neq f(x) = f(x)$
has neither even nor odd symmetry
no symmetry

6. $f(x) = x^4 + x^3 - 3x^2$ $f(-x) = ?$

$$f(-x) = (-x)^4 + (-x)^3 - 3(-x)^2$$
$$= x^4 - x^3 - 3x^2$$

$f(-x) \neq f(x)$ and $f(-x) \neq -f(x)$ $\therefore f(x)$ has neither even nor odd symmetry.

7. $f(x) = x^3 - 8x$ $f(-x) = ?$

$$f(-x) = (-x)^3 - 8(-x)$$
$$= -x^3 + 8x$$

$f(-x) = -f(x)$, so $f(x)$ has odd symmetry. Symmetric about the origin.

8. $f(x) = 2x^3 - 3x^2 - 12x$ $f(-x) = ?$

$$f(-x) = 2(-x)^3 - 3(-x)^2 - 12(-x)$$
$$= -2x^3 - 3x^2 + 12x$$

$f(-x) \neq -f(x)$ and $f(-x) \neq f(x)$ $\therefore f(x)$ has neither even nor odd symmetry.

9. $f(x) = -x^2 - 8$ $f(-x) = ?$

$$f(-x) = -(-x)^2 - 8$$
$$= -x^2 - 8$$

$f(-x) = f(x)$, so $f(x)$ has even symmetry. Symmetric across the y-axis.

10. $f(x) = 1 - 5x^2 - 3x^4$ $f(-x) = ?$

$$f(-x) = 1 - 5(-x)^2 - 3(-x)^4$$
$$= 1 - 5x^2 - 3x^4$$

$f(-x) = f(x)$, so $f(x)$ has even symmetry. Symmetric across the y-axis.

11. $f(x) = x^2 - 4x \Rightarrow$ even? $f(-x) = f(x)$

$$f(-x) = (-x)^2 - 4(-x)$$
$$= x^2 + 4x$$

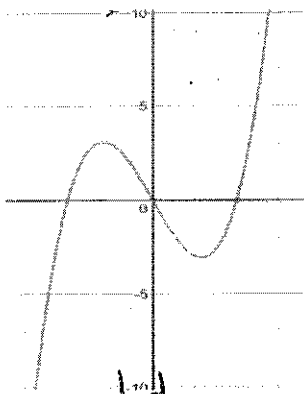
$f(-x) \neq f(x)$, and $f(-x) \neq -f(x) \therefore f(x)$ has neither even nor odd symmetry

12. $f(x) = -2x^3 - 7x + 6 \Rightarrow$ odd? $f(-x) = -f(x)$

$$f(-x) = -2(-x)^3 - 7(-x) + 6$$
$$= 2x^3 + 7x + 6$$

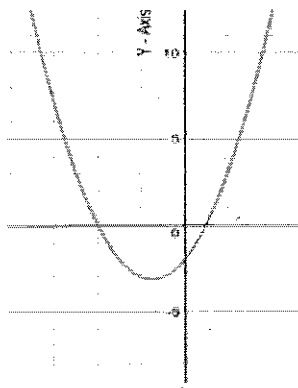
$f(-x) \neq -f(x)$ and $f(-x) \neq f(x) \therefore f(x)$ has neither even nor odd symmetry

Identify the following graphs as having even symmetry, odd symmetry, or neither types of function symmetry.



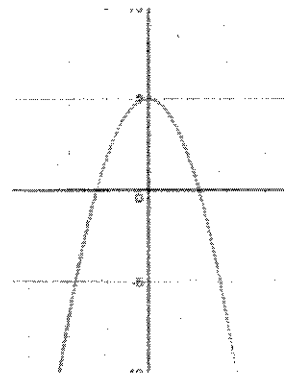
1.

odd



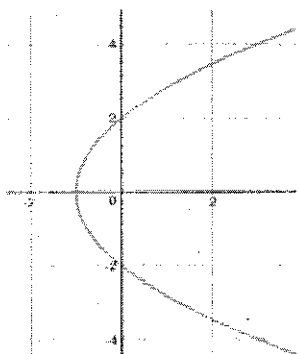
2.

neither



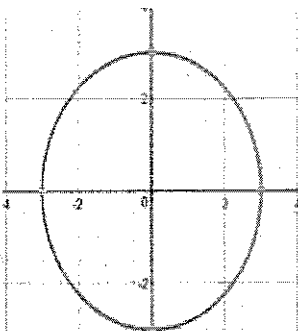
3.

even



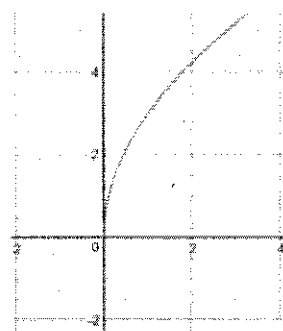
4.

neither



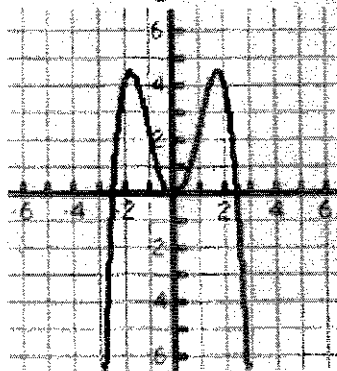
5.

neither



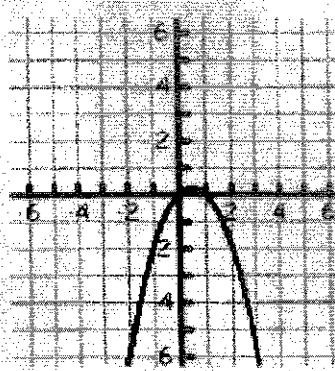
6.

neither



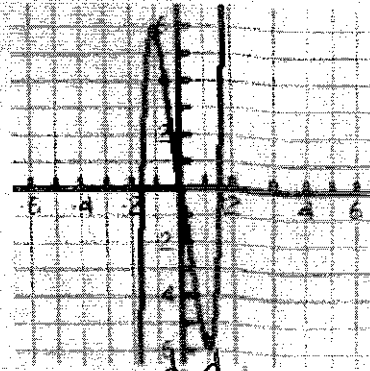
7.

even



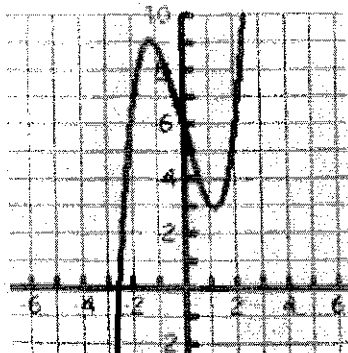
8.

neither



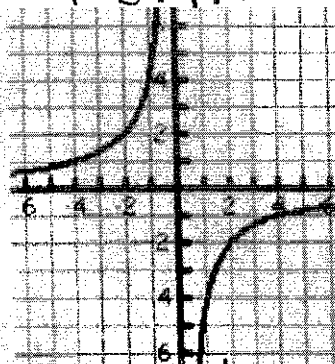
9.

odd



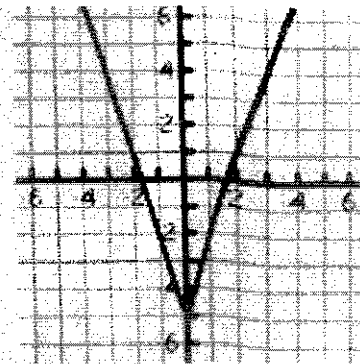
10.

neither



11.

odd



12.

even