1.10 Even/Odd Functions and Symmetry

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Determine whether each of the functions below is even, odd, or neither. Justify your answers.

1.

this function is odd, because the function can be rotated 180° around the origin and the graph will look the same.

2.

this function is neither even nor odd because it can not be mirrored over the y-axis nor rotated around the origin to produce the same graph.

3.

this function is even, because it can be mirrored over the y-axis and the graph will look the same.

4.

this function is odd, because the function can be rotated 180° around the origin and the graph will look the same.

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

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

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

$= 3x^2 + 4$

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

$= -3x^2 - 4$

$f(-x) \neq f(x)$

$\therefore$ the function is even because $f(-x) = f(x)$.

6. $f(x) = -2x + 5$

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

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

$= 2x + 5$

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

$= 2x - 5$

$\therefore$ the function is neither even nor odd because $f(-x) \neq f(x)$ or $-f(x)$.

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

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

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

$= 2x^2 - 3x$

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

$= -2x^2 - 3x$

$\therefore$ the function is neither even nor odd because $f(-x) \neq f(x)$ or $-f(x)$.

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

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

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

$= 3x^2 - x$

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

$= 3x^2 - x$

$f(-x) = -f(x)$

$\therefore$ the function is odd because $f(-x) = -f(x)$.