Precalculus   Name: Key

Even and Odd Functions

Terminology	Definition	Illustration	Type of symmetry of graph
f is an *even* function	$f(x)=f(-x)$ for every x in the domain	$y=f(x)=x^2$	With respect to the y-axis
f is an *odd* function	$-f(x)=f(-x)$ for every x in the domain	$y=f(x)=x^3$	With respect to the origin

Determine whether f is even, odd or neither even nor odd.

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

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

$\boxed{f(-x)=-5x^3-2x}$

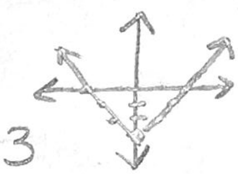
$-f(x)=-1(5x^3+2x)$

$\boxed{-f(x)=-5x^3-2x}$

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

$\therefore$ odd

2. $f(x)=|x|-3$



$f(-x)=|-x|-3$

$f(-x)=|x|-3$

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

$\therefore$ even

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

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

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

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

$\therefore$ even

4. $f(x)=7x^5-4x^3$

$f(-x)=7(-x)^5-4(-x)^3$

$f(-x)=-7x^5+4x^3$

$-f(x)=-7x^5+4x^3$

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

$\therefore$ odd

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

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

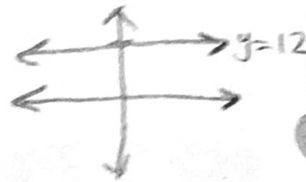
$f(-x)=-8x^3-3x^2$

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

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

$\therefore$ neither

6. $f(x)=12$



$f(-x)=12$

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

$\therefore$ even

7. $f(x)=\frac{1}{x}$

$f(-x)=\frac{1}{(-x)}=-\frac{1}{x}$

$-f(x)=-\frac{1}{x}$

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

$\therefore$ odd

8. $f(x)=3x^2-5x+1$

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

$=3x^2+5x+1$

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

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

$\therefore$ neither

9. $f(x)=\sqrt{x^2+4}$

$f(-x)=\sqrt{(-x)^2+4}$

$f(-x)=\sqrt{x^2+4}$

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

$\therefore$ even

10. $f(x)=\sqrt[3]{x^3-x}$

$f(-x)=\sqrt[3]{(-x)^3-(-x)}$

$=\sqrt[3]{-x^3+x}$

$=\sqrt[3]{-1(x^3-x)}$

$=-\sqrt[3]{x^3-x}$

$-f(x)=-\sqrt[3]{x^3-x}$

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

$\therefore$ odd