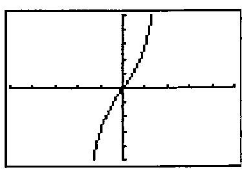
Precalculus Name: **ANSWER KEY**

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



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

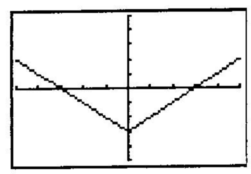
$f(-x)=5(-x)^3+2(-x)$

$=-5x^3-2x$

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

$-f(x)=f(-x)$ $\therefore$ ODD

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



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

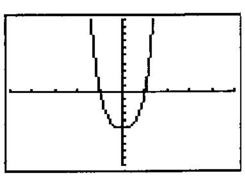
$=x-3$

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

$=x-3$ . . . .

$f(x)=f(-x)$ $\therefore$ EVEN

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



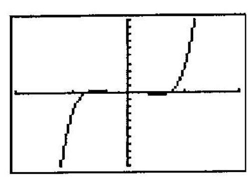
$f(x)=3x^4+2x^2-5$

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

$=3x^4+2x^2-5$

$f(x)=f(-x)$ $\therefore$ EVEN

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



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

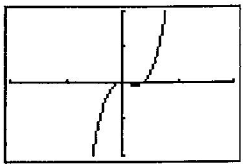
$f(-x)=7(-x)^5-4(-x)^3$

$=-7x^5+4x^3$

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

$-f(x)=f(-x)$ $\therefore$ ODD

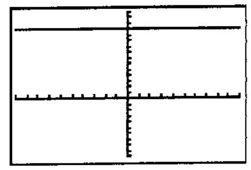
5. $f(x) = 8x^3 - 3x^2$



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

NEITHER

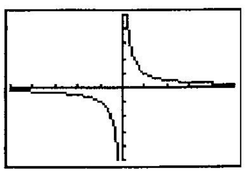
6. $f(x) = 12$



$$f(x) = 12$$
$$f(-x) = 12$$

$f(x) = f(-x)$ $\therefore$ EVEN

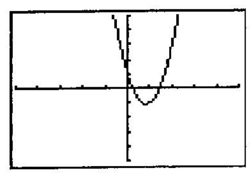
7. $f(x) = \frac{1}{x}$



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

$-f(x) = f(-x)$ $\therefore$ ODD

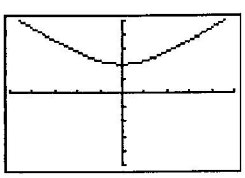
8. $f(x) = 3x^2 - 5x + 1$



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

NEITHER

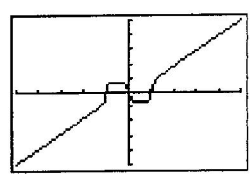
9. $f(x) = \sqrt{x^2 + 4}$



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

$f(x) = f(-x)$ $\therefore$ EVEN

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



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

$-f(x) = f(-x)$ $\therefore$ ODD