Determine algebraically whether each function is even, odd, or neither. SHOW WORK!

1. $y = x^3 + x$

ODD

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

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

$-x^3 - x = -x^3 - x$

2. $y = x^2 + x - 3$

Neither

Not Even

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

$(-x)^2 + (-x) - 3 \neq x^2 + x - 3$

$x^2 - x - 3 \neq x^2 + x - 3$

Not odd

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

$(-x)^2 + (-x) - 3 \neq -(x^2 + x - 3)$

$x^2 - x - 3 \neq -x^2 - x + 3$

3. $y = x^4 + 3x^2$

EVEN

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

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

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

4. $g(x) = \dfrac{4 + x^2}{1 + x^4}$

EVEN

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

$\dfrac{4 + (-x)^2}{1 + (-x)^4} = \dfrac{4 + x^2}{1 + x^4}$

$\dfrac{4 + x^2}{1 + x^4} = \dfrac{4 + x^2}{1 + x^4}$

5. $h(x) = \dfrac{x}{1 + x^2}$

ODD

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

$\dfrac{-x}{1 + (-x)^2} = -\left(\dfrac{x}{1 + x^2}\right)$

$\dfrac{-x}{1 + x^2} = \dfrac{-x}{1 + x^2}$

6. $f(x) = \dfrac{x^5 - 2x^3 - x}{x^2 + 1}$

ODD

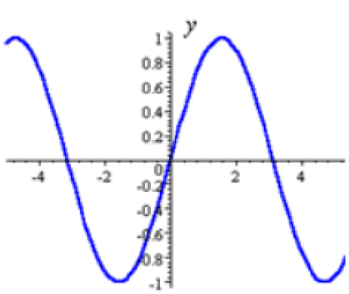
$f(-x) = -f(x)$

$\dfrac{(-x)^5 - 2(-x)^3 - (-x)}{(-x)^2 + 1} = -\left(\dfrac{x^5 - 2x^3 - x}{x^2 + 1}\right)$

$\dfrac{-x^5 + 2x^3 + x}{x^2 + 1} = \dfrac{-x^5 + 2x^3 + x}{x^2 + 1}$

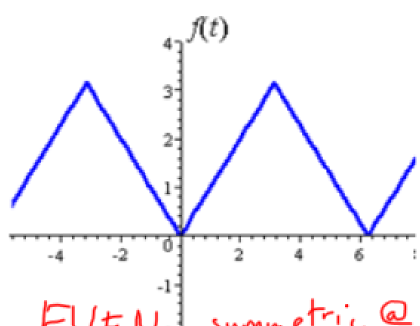
Use the graph to determine if the function is even, odd, or neither.

7.



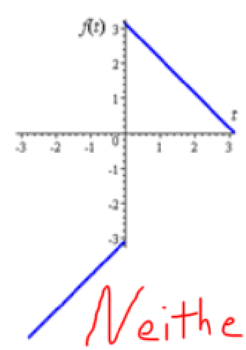
ODD symmetric @ origin

8.



EVEN symmetric @ y-axis

9.



Neither

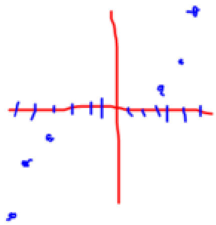
Use the table to determine if the function is even, odd, or neither.

10.

x	y
-4	-128
-5	-250
-6	-432
4	128
5	250
6	432

ODD

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



symmetric @ origin

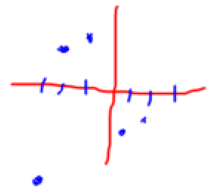
11.

x	y
-3	-11
-2	3
-1	5
1	-3
2	-1
3	13

Neither

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

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



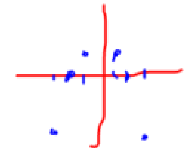
Not symmetric

12.

x	y
-3	-5
-2	0
-1	3
1	3
2	0
3	-5

EVEN

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



symmetric @ y-axis

Given the $f(x)$ is even, fill in the table.

13.

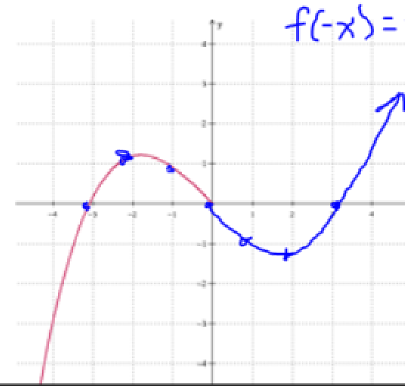
x	$f(x)$
-5	10.5
7	22.5
-9	38.5
-7	22.5
5	10.5
9	38.5

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

Given that the $f(x)$ is continuous on (-5, 5) and odd, draw the graph $f(x)$ from (0,5)

14.

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



REVIEW SKILLS

Use the quadratic formula to solve. Express your solution(s) in exact and decimal form.

1. $9x^2 - 3x = -4$

$+4 \quad +4$

$9x^2 - 3x + 4 = 0$

$$\frac{-(-3) \pm \sqrt{(-3)^2 - 4(9)(4)}}{2(9)}$$

$$\frac{3 \pm \sqrt{9 - 144}}{18}$$

$$\frac{3 \pm \sqrt{-135}}{18} = \frac{3 \pm 3i\sqrt{15}}{18}$$

$$= \frac{\cancel{3}(1 \pm i\sqrt{15})}{\cancel{18}\,6}$$

$$= \frac{1 \pm i\sqrt{15}}{6} = \frac{1}{6} \pm i\frac{\sqrt{15}}{6}$$

$$\boxed{x = 0.1\overline{6} + 0.645i,\quad 0.1\overline{6} - 0.645i}$$

2. $9k^2 - 20 = -12k$

$+12k \quad +12k$

$9k^2 + 12k - 20 = 0$

$$\frac{-12 \pm \sqrt{(12)^2 - 4(9)(-20)}}{2(9)}$$

$$\frac{-12 \pm \sqrt{144 + 720}}{18}$$

$$\frac{-12 \pm \sqrt{864}}{18} = \frac{-12 \pm 12\sqrt{6}}{18}$$

$$= \frac{\cancel{6}(-2 \pm 2\sqrt{6})}{\cancel{18}\,3}$$

$$= \frac{-2 \pm 2\sqrt{6}}{3} = -\frac{2}{3} \pm \frac{2\sqrt{6}}{3}$$

$$\boxed{k = 0.966,\ -2.299}$$