Algebra 2 Unit 1 worksheet: Even and odd functions

Name _____ Date _____ Period _____

1. Decide whether each function is even, odd or neither. Simplify $f(-x)$ and compare it with $f(x)$ and $-f(x)$. When the answer is neither, give one input that shows it.

(a) $f(x) = 2x^6 - x^4 + 9$

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

(c) $f(x) = -3x^9 + x$

(d) $f(x) = x^4 - x^3$

(e) $f(x) = 7$

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

2. Decide whether each function is even, odd or neither. Look at the domain first, then simplify $f(-x)$.

(a) $f(x) = \dfrac{x^2 + 2}{x^3}$

(b) $f(x) = \dfrac{|x|}{x}$

(c) $f(x) = \sqrt{16 - x^2} + x$

(d) $f(x) = |x^3 - 2x|$

(e) $f(x) = x^2$ for $-2 \le x \le 3$

3. Test the graph of each equation for symmetry about the x-axis, the y-axis and the origin. For each symmetry it lacks, give a point on the graph whose partner is not on it.

(a) $x^2 y = 6$

(b) $x = y^2 - 2y$

(c) $x^2 - xy + y^2 = 7$

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4. Arjun tests $f(x) = x^4 + x^3 - 4x$. He works out $f(2) = 16$ and $f(-2) = 16$, and writes: "$f(-2) = f(2)$, so f is even."

(a) Explain what is wrong with Arjun's reasoning.

(b) Simplify $f(-x)$ and use it to show that f is not even. Find every input x at which $f(-x) = f(x)$ does hold.

(c) Is f odd? Use $x = 1$ to decide.

5. Let $f(x) = x^4 + (k-2)x^3 + 5x^2 + (k^2 - 4)x$, where k is a number.

(a) Find every value of k for which f is even, and write f for that value.

(b) Decide whether f is even, odd or neither when $k = -2$.

(c) Explain why no value of k makes f odd.

6. The function f is odd and the function g is even, both defined for every real number. All you know about their values is that $f(3) = 4$ and $g(3) = -2$. Let

$$p(x) = f(x)\,g(x) + x\,g(x), \qquad q(x) = f(x)^2 - 3g(x).$$

(a) Show that p is odd and q is even.

(b) Find $p(-3)$ and $q(-3)$.

(c) Explain why $f(0)$ must be 0.

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