Review of Functions

Dr. Nijat Aliyev

BHOS

Calculus

September 19, 2024

2. The graphs of f and g are given.

(a) State the values of $f(-4)$ and $g(3)$.

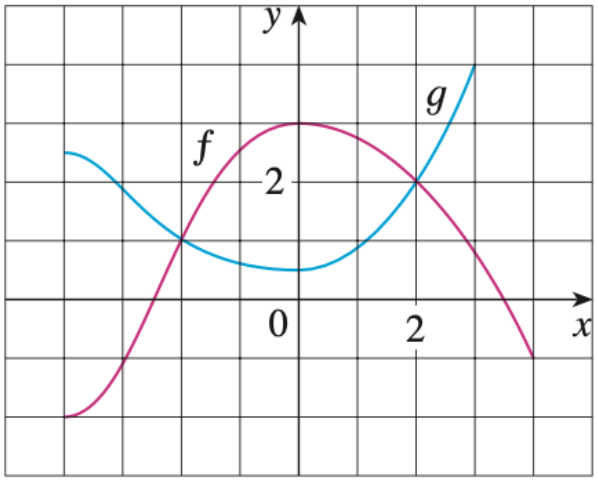
(b) For what values of x is $f(x) = g(x)$?

(c) Estimate the solution of the equation $f(x) = -1$.

(d) On what interval is f decreasing?

(e) State the domain and range of f.

(f) State the domain and range of g.



2. The graphs of f and g are given.

(a) State the values of $f(-4)$ and $g(3)$.

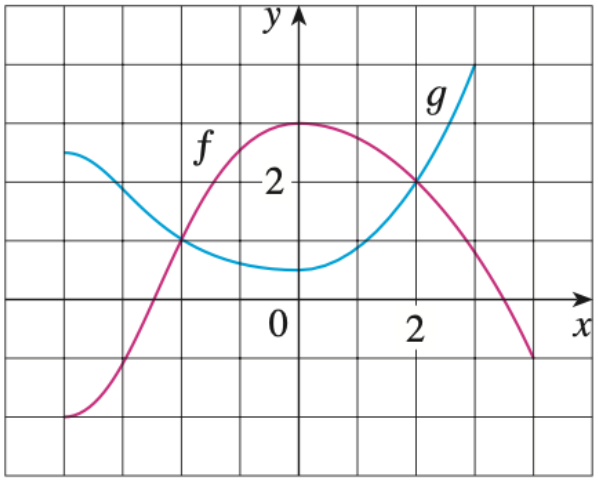
(b) For what values of x is $f(x) = g(x)$?

(c) Estimate the solution of the equation $f(x) = -1$.

(d) On what interval is f decreasing?

(e) State the domain and range of f.

(f) State the domain and range of g.



65–70 Determine whether f is even, odd, or neither. If you have a graphing calculator, use it to check your answer visually.

65. $f(x) = \dfrac{x}{x^2 + 1}$

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

67. $f(x) = \dfrac{x}{x + 1}$

68. $f(x) = x\,|x|$

69. $f(x) = 1 + 3x^2 - x^4$

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

65–70 Determine whether f is even, odd, or neither. If you have a graphing calculator, use it to check your answer visually.

65. $f(x) = \dfrac{x}{x^2 + 1}$

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

67. $f(x) = \dfrac{x}{x + 1}$

68. $f(x) = x\,|x|$

69. $f(x) = 1 + 3x^2 - x^4$

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

31–36 Find the functions (a) $f \circ g$, (b) $g \circ f$, (c) $f \circ f$, and (d) $g \circ g$ and their domains.

31. $f(x) = x^2 - 1, \quad g(x) = 2x + 1$

32. $f(x) = x - 2, \quad g(x) = x^2 + 3x + 4$

33. $f(x) = 1 - 3x, \quad g(x) = \cos x$

34. $f(x) = \sqrt{x}, \quad g(x) = \sqrt[3]{1 - x}$

35. $f(x) = x + \dfrac{1}{x}, \quad g(x) = \dfrac{x + 1}{x + 2}$

36. $f(x) = \dfrac{x}{1 + x}, \quad g(x) = \sin 2x$

31–36 Find the functions (a) $f \circ g$, (b) $g \circ f$, (c) $f \circ f$, and (d) $g \circ g$ and their domains.

31. $f(x) = x^2 - 1, \quad g(x) = 2x + 1$

32. $f(x) = x - 2, \quad g(x) = x^2 + 3x + 4$

33. $f(x) = 1 - 3x, \quad g(x) = \cos x$

34. $f(x) = \sqrt{x}, \quad g(x) = \sqrt[3]{1 - x}$

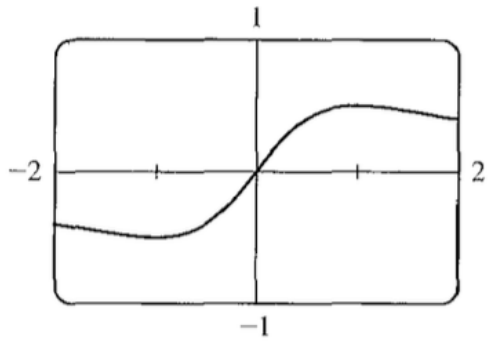
35. $f(x) = x + \dfrac{1}{x}, \quad g(x) = \dfrac{x + 1}{x + 2}$

36. $f(x) = \dfrac{x}{1 + x}, \quad g(x) = \sin 2x$

65. $f(x) = \dfrac{x}{x^2+1}$.

$$f(-x) = \frac{-x}{(-x)^2+1} = \frac{-x}{x^2+1} = -\frac{x}{x^2+1} = -f(x).$$

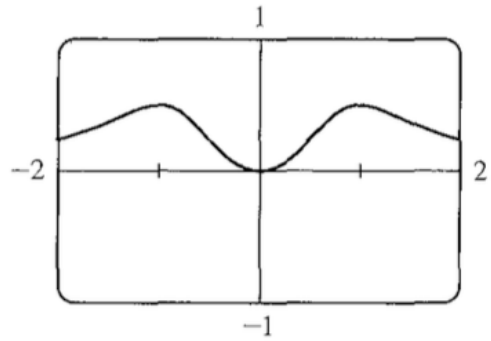
So f is an odd function.



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

$$f(-x) = \frac{(-x)^2}{(-x)^4+1} = \frac{x^2}{x^4+1} = f(x).$$

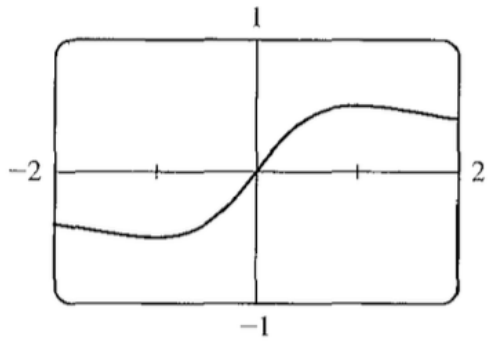
So f is an even function.



65. $f(x) = \dfrac{x}{x^2+1}$.

$$f(-x) = \frac{-x}{(-x)^2+1} = \frac{-x}{x^2+1} = -\frac{x}{x^2+1} = -f(x).$$

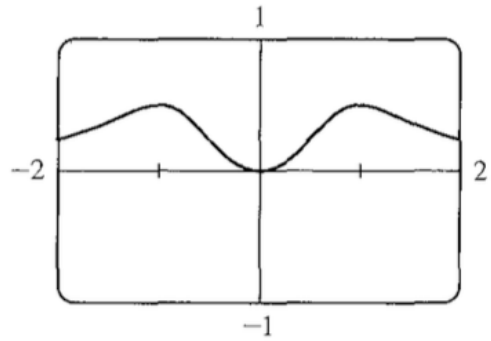
So f is an odd function.



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

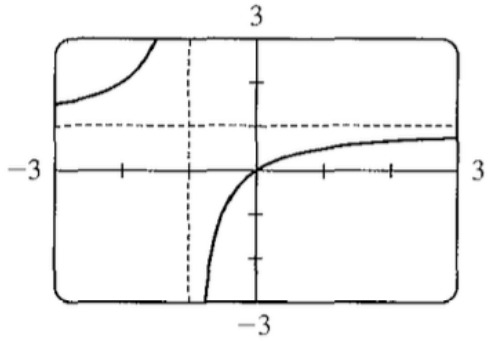
$$f(-x) = \frac{(-x)^2}{(-x)^4+1} = \frac{x^2}{x^4+1} = f(x).$$

So f is an even function.



67. $f(x) = \dfrac{x}{x+1}$, so $f(-x) = \dfrac{-x}{-x+1} = \dfrac{x}{x-1}$.

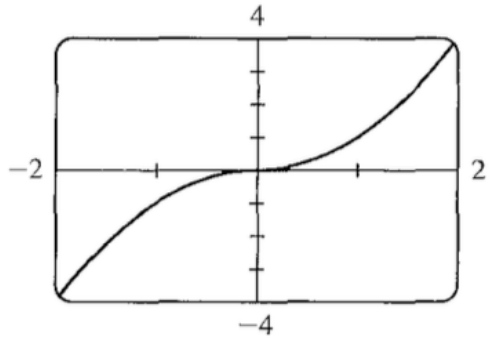
Since this is neither $f(x)$ nor $-f(x)$, the function f is neither even nor odd.



68. $f(x) = x\,|x|$.

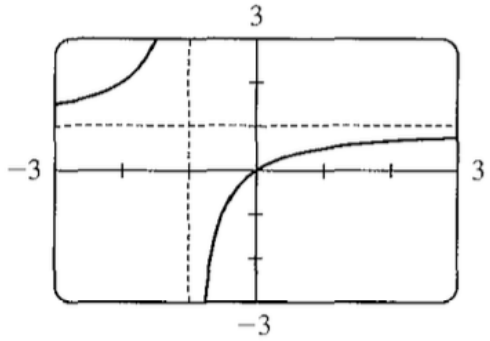
$$f(-x) = (-x)\,|-x| = (-x)\,|x| = -(x\,|x|)$$
$$= -f(x)$$

So f is an odd function.



67. $f(x) = \dfrac{x}{x+1}$, so $f(-x) = \dfrac{-x}{-x+1} = \dfrac{x}{x-1}$.

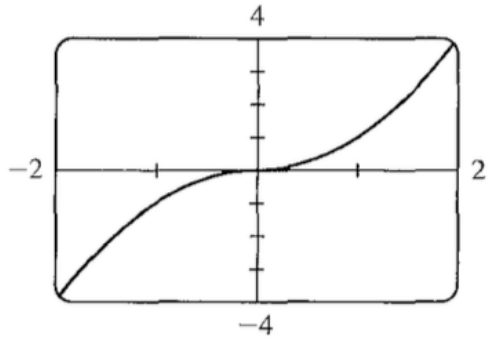
Since this is neither $f(x)$ nor $-f(x)$, the function f is neither even nor odd.



68. $f(x) = x\,|x|$.

$$f(-x) = (-x)\,|-x| = (-x)\,|x| = -(x\,|x|)$$
$$= -f(x)$$

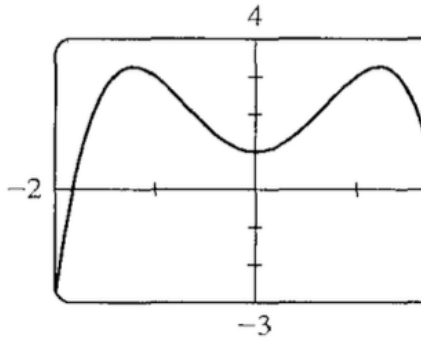
So f is an odd function.



69. $f(x) = 1 + 3x^2 - x^4$.

$f(-x) = 1 + 3(-x)^2 - (-x)^4 = 1 + 3x^2 - x^4 = f(x)$.

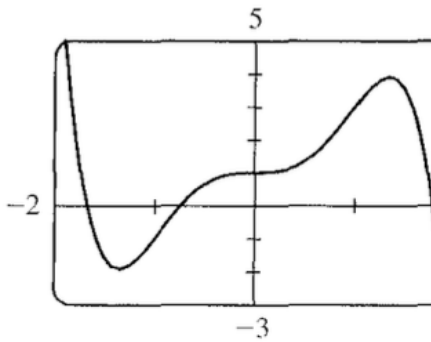
So f is an even function.



70. $f(x) = 1 + 3x^3 - x^5$, so

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

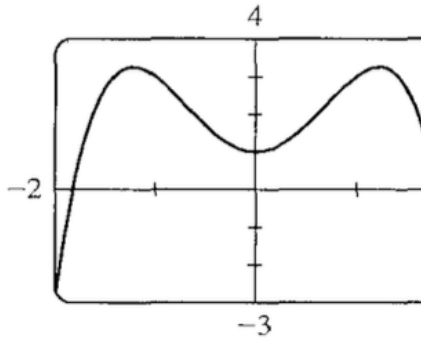
Since this is neither $f(x)$ nor $-f(x)$, the function f is neither even nor odd.



69. $f(x) = 1 + 3x^2 - x^4$.

$f(-x) = 1 + 3(-x)^2 - (-x)^4 = 1 + 3x^2 - x^4 = f(x)$.

So f is an even function.



70. $f(x) = 1 + 3x^3 - x^5$, so

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

Since this is neither $f(x)$ nor $-f(x)$, the function f is neither even nor odd.