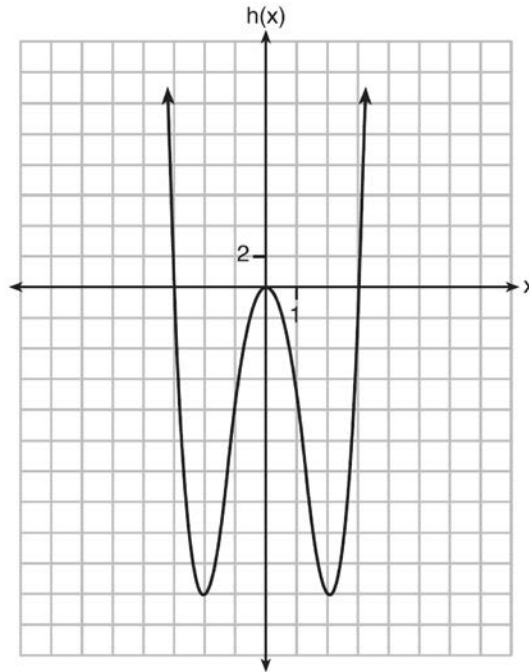


### F.BF.B.3: Even and Odd Functions

1 Functions  $f$ ,  $g$ , and  $h$  are given below.

$$f(x) = \sin(2x)$$

$$g(x) = f(x) + 1$$



Which statement is true about functions  $f$ ,  $g$ , and  $h$ ?

- 1)  $f(x)$  and  $g(x)$  are odd,  $h(x)$  is even.
- 2)  $f(x)$  and  $g(x)$  are even,  $h(x)$  is odd.
- 3)  $f(x)$  is odd,  $g(x)$  is neither,  $h(x)$  is even.
- 4)  $f(x)$  is even,  $g(x)$  is neither,  $h(x)$  is odd.

2 Which graph has line symmetry with respect to the  $y$ -axis?

- 1)  $y = x$
- 2)  $y = x^2$
- 3)  $y = \sin x$
- 4)  $y = \tan x$

3 Which function is even?

- 1)  $f(x) = x^3 + 2$
- 2)  $f(x) = x^2 + 1$
- 3)  $f(x) = |x + 2|$
- 4)  $f(x) = \sin(2x)$

4 Which function is even?

- 1)  $f(x) = \sin x$
- 2)  $f(x) = x^2 - 4$
- 3)  $f(x) = |x - 2| + 5$
- 4)  $f(x) = x^4 + 3x^3 + 4$

5 Which equation represents an odd function?

1)  $y = \sin x$

2)  $y = \cos x$

3)  $y = (x + 1)^3$

4)  $y = e^{5x}$

6 If  $f(x)$  is an even function, which function must also be even?

1)  $f(x - 2)$

2)  $f(x) + 3$

3)  $f(x + 1)$

4)  $f(x + 1) + 3$

7 For  $f(x) = \cos x$ , which statement is true?

1)  $2f(x)$  and  $f(2x)$  are even functions.

2)  $f(2x)$  and  $f(x) + 2$  are odd functions.

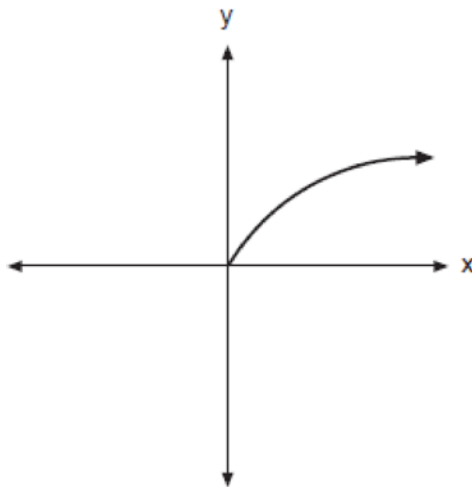
3)  $2f(x)$  and  $f\left(x + \frac{\pi}{2}\right)$  are odd functions.

4)  $f(x) + 2$  is an odd function and  $f\left(x + \frac{\pi}{2}\right)$  is an even function.

8 Can  $f(x) = x^3 + 7$  be classified as an odd function? Justify your answer.

9 Algebraically determine whether the function  $j(x) = x^4 - 3x^2 - 4$  is odd, even, or neither.

10 The entire graph of  $f(x)$  is symmetric with respect to the origin. If the accompanying graph represents  $f(x)$  for  $x \geq 0$ , sketch, on the same set of axes, the graph of  $f(x)$  for  $x \leq 0$ .



### F.BF.B.3: Even and Odd Functions Answer Section

1 ANS: 3

$f(x) = -f(x)$ , so  $f(x)$  is odd.  $g(-x) \neq g(x)$ , so  $g(x)$  is not even.  $g(-x) \neq -g(x)$ , so  $g(x)$  is not odd.  $h(-x) = h(x)$ , so  $h(x)$  is even.

REF: fall1502aaii

2 ANS: 2

REF: 068120siii

3 ANS: 2

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

$$x^2 + 1 = (-x)^2 + 1$$

$$x^2 + 1 = x^2 + 1$$

REF: 082323aaii

4 ANS: 2

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

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

$$x^2 - 4 = x^2 - 4$$

REF: 061806aaii

5 ANS: 1

The graph of  $y = \sin x$  is unchanged when rotated  $180^\circ$  about the origin.

REF: 081614aaii

6 ANS: 2

REF: 081911aaii

7 ANS: 1

REF: 062318aaii

8 ANS:

No, because a  $180^\circ$  rotation of  $f$  about the origin does not map  $f$  onto itself.

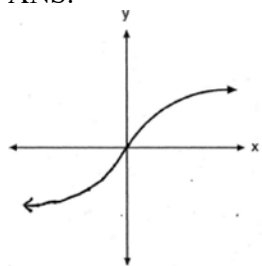
REF: 062432aaii

9 ANS:

$j(-x) = (-x)^4 - 3(-x)^2 - 4 = x^2 - 3x^2 - 4$  Since  $j(x) = j(-x)$ , the function is even.

REF: 081731aaii

10 ANS:



REF: 060821b