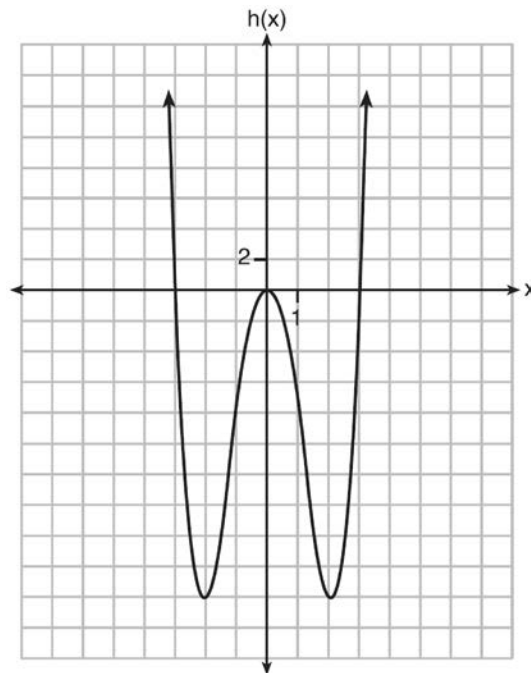## F.BF.B.3: Even and Odd Functions 1

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

2 The graph of which equation is symmetric with respect to the origin?
1) $y = -3$ 3) $y = \sin x$
2) $x = 2$ 4) $y = \cos x$

3 Which graph has line symmetry with respect to the y-axis?
1) $y = x$ 3) $y = \sin x$
2) $y = x^2$ 4) $y = \tan x$

4 Which function is even?
1) $f(x) = x^3 + 2$ 3) $f(x) = |x + 2|$
2) $f(x) = x^2 + 1$ 4) $f(x) = \sin(2x)$

5   Which function is even?
    1) $f(x) = \sin x$ 3) $f(x) = |x - 2| + 5$
    2) $f(x) = x^2 - 4$ 4) $f(x) = x^4 + 3x^3 + 4$

6   Which equation represents an odd function?
    1) $y = \sin x$ 3) $y = (x + 1)^3$
    2) $y = \cos x$ 4) $y = e^{5x}$

7   If $f(x)$ is an even function, which function must also be even?
    1) $f(x - 2)$ 3) $f(x + 1)$
    2) $f(x) + 3$ 4) $f(x + 1) + 3$

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

    1) $2f(x)$ and $f(2x)$ are even functions.   3) $2f(x)$ and $f\left(x + \dfrac{\pi}{2}\right)$ are odd functions.

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

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

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 $x \leq 0$.
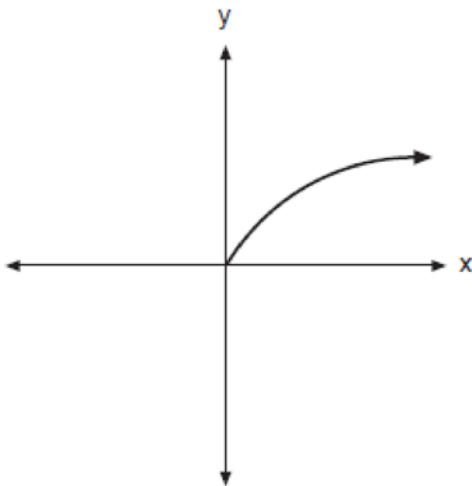
F.BF.B.3: Even and Odd Functions 1
Answer Section

1 ANS: 3
   $f(x) = -f(x)$, so $f(x)$ is odd. $g(-x) \ne g(x)$, so $g(x)$ is not even. $g(-x) \ne -g(x)$, so $g(x)$ is not odd. $h(-x) = h(x)$, so $h(x)$ is even.

   REF: fall1502aii
2 ANS: 3   REF: 018929siii
3 ANS: 2   REF: 068120siii
4 ANS: 2

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

   REF: 082323aii
5 ANS: 2

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

   REF: 061806aii
6 ANS: 1
   The graph of $y = \sin x$ is unchanged when rotated 180º about the origin.

   REF: 081614aii
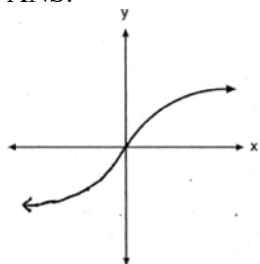7 ANS: 2   REF: 081911aii
8 ANS: 1   REF: 062318aii
9 ANS:
   No, because a 180º rotation of f about the origin does not map f onto itself.

   REF: 062432aii
10 ANS:

   REF: 060821b