1. Determine if the following functions are even, odd, or neither.
   (a) $f(x) = x^2 - 1$
   (b) $f(x) = \sin(x)$
   (c) $f(x) = 42$
   (d) $f(x) = x + \sin(x)$
   (e) $f(x) = x^2 - 3\cos(x)$
   (f) $f(x) = x^2 + x + 1$

2. Find the domain of the following functions.
   (a) $f(x) = x$
   (b) $f(x) = \sqrt{x + 3}$
   (c) $f(x) = \sqrt{4 - \sqrt{x}}$
   (d) $f(x) = \frac{1}{x} + \frac{1}{x-1} + \frac{1}{x-2} + \cdots + \frac{1}{x-10}$

3. If
$$f(x) = \frac{x^3 - 1}{x - 1}, \quad g(x) = x^2 + x + 1$$
   is it true $f = g$?

4. Let $f(x) = \sqrt{x}$. Plot the graphs of the following functions. Also describe the domains.
   (a) $y = f(x)$
   (b) $y = f(x + 1)$
   (c) $y = 3f(x)$
   (d) $y = f(x) - 3$
   (e) $y = 2f(x - 1) + 2$

5. Let
$$f(x) = x + \frac{1}{x}, \quad g(x) = \frac{x + 1}{x + 2}.$$
   Find $f \circ g$ and $g \circ f$. What are the domains of these functions?

1. Determine if the following functions are even, odd, or neither.

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

    (a) even

    (b) odd

    (c) even

    (d) odd

    (e) even

    (f) neither

    Note that (even) + (even) = (even) and (odd) + (odd) = (odd).

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2. Find the domain of the following functions.

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    (d) $f(x) = \frac{1}{x} + \frac{1}{x-1} + \frac{1}{x-2} + \cdots + \frac{1}{x-10}$

    (a) All $x \in \mathbb{R}$.

    (b) $x \geq -3$

    (c) $0 \leq x \leq 16$. All the values in square roots should be nonnegative, which gives
        $x \geq 0$ and $4 - \sqrt{x} \geq 0 \Leftrightarrow x \leq 16$.

    (d) All the values in the denominator should be nonzero. Hence $x \in \mathbb{R} \setminus \{0, 1, 2, \ldots, 10\}$.

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3. If
$$f(x) = \frac{x^3 - 1}{x - 1}, \quad g(x) = x^2 + x + 1$$
    is it true $f = g$?

No, because $f(x)$ is not defined at $x = 1$ but $g(x)$ is, even they agree on any other $x \neq 1$.

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For the graphs, visit the following link: https://www.desmos.com/geometry/lschqf-much

   (a) $x \geq 0$

   (b) $x \geq -1$

   (c) $x \geq 0$

   (d) $x \geq 0$

   (e) $x \geq 1$

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5. Let
$$f(x) = x + \frac{1}{x}, \quad g(x) = \frac{x+1}{x+2}.$$
Find $f \circ g$ and $g \circ f$. What are the domains of these functions?

$$(f \circ g)(x) = f(g(x)) = \frac{x+1}{x+2} + \frac{x+2}{x+1} = \frac{2x^2 + 6x + 5}{(x+2)(x+1)}$$

$$(g \circ f)(x) = g(f(x)) = \frac{x + \frac{1}{x} + 1}{x + \frac{1}{x} + 2} = \frac{x^2 + x + 1}{x^2 + 2x + 1} = \frac{x^2 + x + 1}{(x+1)^2}$$

The domains are $x \neq -1, -2$ and $x \neq -1$, respectively.