Unit 2: Functions

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1. Define a function and give an example of a function that is neither even nor odd.
2. Determine whether f(x) = |x| is even, odd, or neither.
3. If f(x) = 3x + 2, find f(−2).
4. State the condition for a function to be one-to-one.
5. Determine if $f(x) = x^2$ is one-to-one over the set of real numbers.
6. Find the domain of f(x) = 1 / (x − 3).
7. Find the range of $f(x) = \sqrt{(x - 1)}$.
8. Determine the domain of f(x) = ln(x + 4).
9. If $f(x) = \sqrt{(9 - x^2)}$, find the domain.
10. Find the range of $f(x) = (x^2 - 1)/(x^2 + 1)$.
11. If f(x) = 2x + 3 and $g(x) = x^2$, find (f ∘ g)(x).
12. If $f(x) = \sqrt{x}$ and g(x) = x − 2, find (g ∘ f)(x).
13. Given f(x) = 1/x and g(x) = x + 5, find (f ∘ g)(2).
14. If f(x) = 3 − x and $g(x) = x^2$, find (g ∘ f)(x).
15. Determine if composition of functions is commutative.
16. Give an example of a polynomial function of degree 3.
17. Give an example of an exponential function.
18. Give an example of a rational function.
19. Give an example of a piecewise-defined function.
20. Give an example of a periodic function.
21. Define the inverse of a function.
22. Find the inverse of f(x) = 2x + 5.
23. Determine if $f(x) = x^3 + 2$ has an inverse.
24. Find the inverse of f(x) = (x − 3)/(x + 2).
25. Show that f(x) = e^x and $f^{-1}(x) = \ln(x)$ are inverses.
26. Factorize $x^2 - 9$.
27. Factorize $x^3 - 8$.
28. Factorize $x^2 + 5x + 6$.
29. Factorize $x^3 + 27$.
30. Factorize $x^4 - 16$.
31. Solve $x^2 - 5x + 6 = 0$.
32. Solve $2x^2 + 3x - 2 = 0$.
33. Find the discriminant of $x^2 - 4x + 4 = 0$ and comment.

34. Solve $x^2 + x + 1 = 0$.
35. Find the roots of $4x^2 - 4x + 1 = 0$.
36. Solve $x - 3 > 0$.
37. Solve $2x + 5 \leq 9$.
38. Solve $|x - 2| < 5$.
39. Solve $3x - 7 \geq 2x + 4$.
40. Solve $-2x + 1 < 5$.
41. Explain why a function can't have two different outputs for the same input.
42. Can the graph of a function intersect a vertical line more than once?
43. If $f(x) = x^2$, what is $f(\sqrt{2}) + f(-\sqrt{2})$?
44. Find all x such that $f(x) = f(-x)$ for $f(x) = x^3 - x$.
45. If $f(x) = x + 1/x$, find $f(2) + f(1/2)$.
46. Solve for x: $\sqrt{(x + 1)} - \sqrt{x} = 1$.
47. If $f(x) = ax + b$ and $f^{-1}(x) = 2x - 3$, find a and b.
48. If $f(x) = x^2$ and $g(x) = \sqrt{x}$, is g the inverse of f?
49. For which values of k is $x^2 + kx + 4 = 0$ having equal roots?
50. If $f(x) = 2x^2 - 3x + 1$, find $f(1) + f(-1)$.