1. Let \( f(x) = x^4 \). Find \( f(2) \), \( f(4a) \), and \( f(a - 5) \).

2. Let \( f(x) = -x^2 + 5x + 11 \). Find \( 2f(a) \), \( f(2a) \), \( f(a^2) \), \( f(a)^2 \), and \( f(a + h) \).

3. Let \( f(x) = \frac{x+3}{x+1} \). Find \( \frac{f(x) - f(1)}{x - 1} \).

4. Explain the difference between something failing to be a function because of the ‘Vertical Line Test’ and failing because a single \( x \)-value was mapped to multiple \( y \)-values.

5. Classify, with justification, whether the following functions are even or odd.
   (a) \( f(x) = x^2 \)
   
   (b) \( f(x) = x^3 + x \)
   
   (c) \( f(x) = x^3 + 1 \)
6. If the expression given defines a function, find its domain.
   (a) Mapping each student in the classroom to the seat in which they are sitting.

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

   (c) \( f(x) = \frac{x^{10}+x^4+x^3+x+11}{x-1} \)

7. After years of intense research, UC-Berkeley’s science faculty have determined that the ‘awesomeness’ of logic (\( L \)) is a linear function of the amount of time you’ve spent studying logic (\( S \)). In particular, scientists believe this function to be \( L = \frac{8}{5}S + 10 \).
   (a) Sketch a graph of this function

   (b) What is the slope of the graph and what does it represent?

   (c) What is the \( S \)-intercept of the graph and what does it represent?

8. Let \( f(x) = \frac{x^2}{x-1} \) and define the domain of \( f(x) \) as the real line (\( \mathbb{R} \)). Is \( f(x) \) a function? Why or Why not?

9. Let \( f(x) = x^3 - 4, g(x) = x^2 \). Find \( f \circ g(x) \) and \( g \circ f(x) \).

10. Simplify the following:
    (a) \( x^5(x^4) \)

    (b) \( \frac{x^{-2}}{x^4} \)

    (c) \( \frac{4^{-3}}{x^4} \)