Worksheet 2: More PreCalc!

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

   (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) $\frac{4^{-3}}{2^{-6}}$