Explain, in a (complete) sentence or two, your reasoning.

1. Let f be the function defined by $f(x) = \sin(x) + \cos(x)$, and let g be the function defined by $g(u) = \sin(u) + \cos(u)$, for all real numbers x and u. Then

    A. f and g are exactly the same function

    B. if x and u are different numbers, f and g are different functions

    C. not enough information is given to determine if f and g are the same

2. If $f(x) = \frac{x^2 - 4}{x - 2}$ and $g(x) = x + 2$, then the functions $f(x)$ and $g(x)$ are equal.

    A. True

    B. False

    Graph these functions. Explain.

3. You were once exactly 3 feet tall.

    A. True

    B. False

The **average rate of change between** a **and** b of a function $f(x)$ is defined as $\dfrac{f(b) - f(a)}{b - a}$. This is the change in the values divided by the change in the inputs, as the input changes from a to b.

Consider the functions

$$g(x) = \frac{1}{10} \cdot 2^x$$

and

$$h(x) = x^2$$

(use just a calculator to answer, only graph at question 8)

4. What is the average rate of change of $g(x)$, and of $h(x)$, between 0 and 10?

5. What is the average rate of change of g between 0 and 5, and what is the average rate of change between 5 and 10? The same question for $h(x)$.

6. Make a table of the average rates of change of $g(x)$ and $h(x)$ between 0 and 1, 1 and 2, 2 and 3, and so on, until 9 to 10. Do you see the patterns?

Interval	Avg R.o.C. of $g(x)$	Avg R.o.C. of $h(x)$
$(0, 1)$		1
$(1, 2)$		
$(2, 3)$	0.4	
$(3, 4)$		7
$(4, 5)$		
$(5, 6)$	3.2	
$(6, 7)$		
$(7, 8)$	2.56	
$(8, 9)$		17
$(9, 10)$		

7. Graph the functions $g(x)$ and $h(x)$ in the domain between $x = 0$ and $x = 20$. Are they similar? Different? In what ways?

8. Consider the function
$$f(x) = \frac{(3x^4 - 7x^3 - 3x)}{(x^2 - x + 2)(2^x + 2^{-x})}.$$

(a) Graph $2 \cdot f(x)$. Graph $3 \cdot f(x)$. Graph $5 \cdot f(x)$. Graph $10 \cdot f(x)$. Graph $\frac{1}{2} \cdot f(x)$. Meditate.

(b) Graph $f(2x)$. Graph $f(3x)$. Graph $f(5x)$. Graph $f(10x)$. Graph $f(\frac{1}{2}x)$. Meditate.