

PRECALCULUS

01 - COMPOSITE AND INVERSE FUNCTIONS

- * **Function composition** is the action of combining two functions in such a way so that the outputs of one function becomes the input of the other.

$$f(g(x)) = (f \circ g)(x) = \text{"f composed with g"}$$

- * We can evaluate a composite function either by "inside out evaluation" or by finding the composite function by substitution."
- * We can use "The last output as a function of the first input" expression to express a composite function in terms of the model it generates.
- * When we compose functions, we must make sure that it makes sense to plug the output of the inner function as an input for the outer function.
- * **Inverse functions** reverse each other: $f(a) = b \Rightarrow f^{-1}(b) = a$
- * A function is invertible only if there is a one-to-one relationship between its domain and range.
- * If we can draw a horizontal line that intercepts the function on multiple points on the graph, then the function is invertible.
- * If the function has both increasing and decreasing intervals, it is not invertible within a domain that includes a minima or maxima.
In this case, we can restrict its domain to make it invertible.
- * The graph of $y = f^{-1}(x)$ is the reflection of the graph of $y = f(x)$ across the line $y = x$.
- * $f(g(x)) = g(f(x)) = x \Rightarrow f(x)$ and $g(x)$ are inverses of each other.
- * We can use specific values to prove that two continuous functions are not inverses of each other, but we can not use specific values to prove that two continuous functions are inverses of each other.