Math 1232: Single-Variable Calculus 2
George Washington University Fall 2024
Recitation 1

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Problem 1. (a) Is the function $f(x) = |x|$ one-to-one? Prove it is, or find a counterexample.

(b) Is the function $g(x) = 5x^3 + 3$ one-to-one? Prove it is, or find a counterexample.

(c) Find an inverses for any of these functions that were one-to-one.

Problem 2. Consider the function $f(x) = x^4$.

(a) Is this one-to-one?

(b) Can you find a smaller, restricted domain on which it's one-to-one?

(c) Find an inverse on your restricted domain.

(d) Can you find a completely different restricted domain? Find an inverse on that domain.

Problem 3. Consider $f(x) = \cos(x)$.

(a) Is this function one-to-one? Why or why not?

(b) What domains can you restrict it to to get a one-to-one function?

(c) What value "should" you pick to solve $\cos(x) = 0$? What about $\cos(x) = 1$? $\cos(x) = -1$?

(d) What domain should you pick to create an inverse?

Problem 4. Let $f(x) = x^5 + x$.

(a) Is this function one-to-one? You won't be able to prove it directly from the definition, but you can use calculus to make a clear argument.

(b) Can you find an inverse for this function?

(c) Can you find $f^{-1}(2)$? $f^{-1}(34)$? $f^{-1}(-2)$?

(d) Can you find $(f^{-1})'(2)$?

(e) Can you find $(f^{-1})'(34)$? $(f^{-1})'(-2)$?

Problem 5. Let $g(x) = \sqrt[3]{x^3 + x + 6}$.

(a) Can you compute an inverse for g?

(b) Can you find $(g^{-1})'(2)$?

Problem 6. (a) Consider the functions $f(x) = x^3 - x^2 + x$ and $g(x) = x^3 - x^2 - x$. Which one is invertible and why?

(b) Consider the functions $f(x) = 3^x + x$ and $g(x) = 3^x - x$. Can you figure out which one is invertible?