

Math 1232 Spring 2026
Single-Variable Calculus 2
Mastery Quiz 1
Due Thursday, January 22

This week's mastery quiz has one topic. Please submit your best attempt at answering the questions on that topic. Don't worry if you make a minor error, but try to demonstrate your mastery of the underlying material.

Feel free to consult your notes, but please **don't discuss the actual quiz questions with other students in the course.**

Remember that you are trying to demonstrate that you understand the concepts involved. For all these problems, justify your answers and explain how you reached them. Do not just write "yes" or "no" or give a single number.

Please turn this quiz in class on Thursday. You may print this document out and write on it, or you may submit your work on separate paper; in either case make sure your name and recitation section are clearly on it.

Topics on This Quiz

- Secondary Topic 1: Invertible Functions

Name:

Recitation Section:

S1: Invertible Functions

- (a) Give an exact solution (with no decimals) for the equation $6^{x-5} = 4$.

Solution:

$$6^{x-5} = 4$$

$$x - 5 = \log_6(4)$$

$$x = 5 + \log_6(4).$$

- (b) Let $h(x) = \sqrt{x^3 + x + 6}$. Compute $(h^{-1})'(4)$.

Solution: By the Inverse Function Theorem, we know that

$$(h^{-1})'(4) = \frac{1}{h'(h^{-1}(4))}.$$

Guess and check shows that $h(2) = 4$ so $h^{-1}(4) = 2$. And we know that

$$h'(x) = \frac{1}{2}(x^3 + x + 6)^{-1/2}(3x^2 + 1)$$

and thus

$$h'(2) = \frac{1}{2}(16)^{-1/2}(13) = \frac{13}{8}.$$

Thus

$$(h^{-1})'(4) = \frac{1}{13/8} = \frac{8}{13}.$$

- (c) Is $g(x) = 2 + \sqrt{3-x}$ invertible? If so, find a formula for the inverse. If not, explain why not.

Solution:

$$y = 2 + \sqrt{3-x}$$

$$y - 2 = \sqrt{3-x}$$

$$(y - 2)^2 = 3 - x$$

$$x = 3 - (y - 2)^2$$

so $g^{-1}(y) = 3 - (y - 2)^2$. (Alternatively, $g^{-1}(x) = 3 - (x - 2)^2$. You can use whichever variable you like in your formula.)