

Math 1232 Spring 2022  
Single-Variable Calculus 2 Mastery Quiz 1  
Due Tuesday, January 18

This week's mastery quiz has only one topic. Please submit a complete and fully justified answer.

Feel free to consult your notes or speak to me privately, but please don't talk about the actual quiz questions with other students in the course or post about it publicly.

Don't worry if you make a minor error, but try to demonstrate that you understand the concepts involved and have mastered the underlying material. 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 Tuesday. 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. If you absolutely cannot turn it in in person, you can submit it electronically through Blackboard but this should be a last resort.

**Topics on This Quiz**

- Secondary Topic 1: Invertible Functions

**Name:**

**Recitation Section:**

## S1: Invertible Functions

- (a) Is  $f(x) = x^2 + x$  invertible or not? Justify your answer.

**Solution:** We have  $f(-1) = f(0) = 0$  so this function is not one-to-one, and thus not invertible.

- (b) Give an exact (no decimals) solution for the equation  $\ln(2x + 5) = 3$ .

**Solution:**

$$\begin{aligned}\ln(2x + 5) &= 3 \\ 2x + 5 &= e^3 \\ 2x &= e^3 - 5 \\ x &= \frac{e^3 - 5}{2}.\end{aligned}$$

- (c) 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

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