MATH 141, Fall 2025, QUIZ 1 ANSWERS.

General comments. The biggest lesson for you in this quiz is not whether you know how to do certain problems (although that may be important, and I'll say more below). The biggest lesson is that if all you have done is gotten WebAssign to give you a green checkmark, you haven't mastered the homework assignment.

To learn calculus, you need to *get to the point where you know how to do the problem.* It's not enough to only *get to the point where you can put in the right answer once to WebAssign.* If you finish your homework and you're not confident that you could do the problems again from scratch without looking back at your WebAssign answers, then you need more practice. Try the problems again, do extra problems from the book, etc.

1. For any number $a > 0$, the inverse of $f(x) = \log_a(x)$ is $f^{-1}(x) = a^x$. (On your quiz, a was 2, 3, 4, or 5.)

This is one of your WebAssign problems, with a different number, and was also testing something that I said in class you should be comfortable with from precalc. You need to be clear that the inverse function of $\log_a(x)$ *is* a^x*, and vice versa,* and also what that means. *I won't be testing that directly in the course any more, but we'll need it as we move forward.*

2. There were several forms of the problem. I'll show the work for one of them, and the others are similar:

$$\begin{aligned}\frac{f(x+h)-f(x)}{h} &= \frac{(x+h)^2+5(x+h)-(x^2+5x)}{h}\\ &= \frac{x^2+2hx+h^2+5x+5h-x^2-5x}{h}\\ &= \frac{2hx+h^2+5h}{h}\\ &= \frac{h(2x+h+5)}{h}\\ &= 2x+h+5.\end{aligned}$$

(Your answer might instead have been $2x+h+6$ or $2x+h+3$ or $2x+h+2$.)

This is like one of your WebAssign problems, but with much simpler algebra involved. If you struggled, it's likely that the problem was understanding what $f(x+h)$ *actually means. I get (and remember from my student days) that that can feel confusing. You need to (and can) get your brain around it soon, because it comes up again soon in the course. For others of you, there were algebra errors in the simplification. One solution to that is more practice. Another solution is to identify and correct common misunderstandings, like for example incorrectly expanding* $(x+h)^2$ *as* x^2+h^2*.*

3. Again, there were several forms of the problem. I'll do this one:

$x = \tan t$ and $y = 2\tan t$ with $-\frac{\pi}{2} < t < \frac{\pi}{2}$.

Since $\tan t$ is x, the second equation says $y = 2x$. That's a Cartesian equation of the curve. (Your answer might instead have been $y = 5x$, $y = 4x$, or $y = 6x$.)

If you exactly followed the procedure for eliminating the parameter, you started by writing $t = \arctan x$ *and then writing* $y = 2\tan(\arctan(x))$*, which simplifies to* $y = 2x$*. (This is using "inverse functions" as in Problem 1.) If you had incorrect trig ideas that led you to write something incorrect like* $t = \frac{x}{\tan}$*, you need to correct those. (Sometimes we write* f^{-1} *for an inverse function and specifically* $\tan^{-1}$ *for* arctan*, but this exponent* $^{-1}$ *is* not *a reciprocal. That's why I, and your textbook, will be using* arctan*, not* $\tan^{-1}$*.) Trig will show up all through the course.*