

**MAT 137Y: Calculus!**  
**Problem Set 3 - Common errors**

[Q2] In the sample solutions we defined a family of functions  $h_n$  and proved a formula for their derivative using induction.

There are other ways to solve this problem without using induction. You could work only with the function  $h$  and compute its derivative directly.

However, computing the derivative of  $h_1, h_2, h_3$  and guessing a pattern without proving it is not enough.

[Q3a] Some of you did not follow the instructions. If you derived a formula for the derivative of  $\sin$  (basically copying the derivation in Video 3.11) and  $\cos$ , and then use the quotient rule to obtain a derivative of  $\tan$ , you got 0 points. That is not what we asked you to do.

[Q3bcd] Don't bluff.

Some of you made incorrect calculations/derivations that lead to wrong answers. Since you knew what the final answer was supposed to be, you would then pretend that your expression was equal to the correct final answer. Maybe you were hoping we would not notice and you would get some marks? It does not work. This kind of dishonesty gets you an automatic zero on the whole question.

If you notice you have made an error, you have two options: try to fix it, or honestly state that you realize this is incorrect. Never bluff.

[Q4] When you use a theorem like the IVT in the middle of a proof, make sure to verify the hypotheses of the theorem.

In addition, some of you are still having trouble working with variables and quantifiers.

- If you write something like “ $\forall y \in \mathbb{R}, \dots$ ”, the variable  $y$  is quantified. It does not have any intrinsic meaning. It has not been fixed. You cannot do arithmetic with it. You cannot, for example, say, “I take  $z = y + 1$ ” because “ $y$ ” does not mean anything yet.
- If you write “Let  $y \in \mathbb{R}$ ” it means you are fixing a(n arbitrary) value of  $y$ . You can now do arithmetic with it.
- Once you fix the value of a variable, it is fixed. Forever. It is incorrect to later re-use the same variable with a quantifier.