

**MAT 137Y: Calculus!**  
**Problem Set 7 - Common errors**

[Q1] The grading scheme in this question was 3 points for the calculation and 3 points for the explanation. Most of you did the calculation pretty well, but not necessarily the explanation. Here are some things that need to be justified.

- If you are using L'Hôpital's Rule because you have a certain indeterminate form, say so.
- More generally, before using a theorem you need to verify the hypotheses are satisfied. This also applies to L'Hôpital's Rule and the Fundamental Theorem of Calculus.
- More specifically, in order to use FTC, you need to know the function in the integrand to be continuous. In this specific problem, since you use FTC twice, you need to justify that  $f(s) = e^{-s^2}$  is continuous and also that  $g(t) = \int_{ct}^{kt} e^{-s^2} ds$ . So, why are they continuous?
- If you write something like

$$\lim_{x \rightarrow 0} \int_{ax}^{bx} g(t) dt = \int_0^0 g(t) dt = 0$$

you are implicitly using that the function  $H(x) = \int_{ax}^{bx} g(t) dt$  is continuous at 0. Otherwise, you cannot compute a limit by “plugging in  $x = 0$ ”. Acknowledge that this is what you are doing, and explain why the function is continuous.

- [Q2]
- If you “guessed” the equation for  $f$  and solved the problem using it, then you got no credit. You cannot be certain that that is the equation. There are many different functions with similar-looking graphs. Your answer needs to be based only on the graph, the definition of  $H$ , and the theorems you know.
  - Finding the critical points was not enough: you still have to justify which ones are local max, local min, or neither.
  - If a function  $H$  has a critical point at  $c$  such that  $H'(c) = 0$  and  $H''(c) = 0$ , then you cannot draw a conclusion about what type of critical point it is: it may still be a local max, a local min, or neither.