Common Mistakes on Exam #1

Problem 1: Receiving full credit on this problem rested solely on the correct statement of the definition of a function, and applying it in the context: a rule is a function if it takes each input to exactly one output. If this was mentioned, full credit was given; if this was alluded to but was somewhat unclear (such as mentioning the vertical line test), half credit was given. If this definition was not mentioned at all, no credit was given. (Some mistook this question for asking if the model was a complete model, which unfortunately received no points).

Problem 2: The operation which was to be used to compose these functions was function composition: \((C \circ P)(t) = C(P(t))\), instead of function multiplication: \((C \cdot P)(t) = C(t)P(t)\) (which can not happen in this context because it does not make sense). One bonus point was given for the true correct answer: \((C \circ (1000 \cdot P))(t) = C((1000 \cdot P(t)))\), but no points were taken off for leaving out the multiplication by 1000. Getting part (a) correct was crucial, as all the other points were based off of it.

The following general errors were made on problems 3 - 8:

- Regardless of how the data is rounded, the model (as stated in the parts of a complete model) is always rounded to 3 decimal places, no matter what.

- In a few cases, the meaning of the specific rounding directions, such as “tenths”, “hundredths”, or “thousandths” place was forgotten or ignored.

- If no rounding guidelines are specifically stated, then you look to the data for how to round the answer.

- While most people remembered the concept of a complete model, sometimes a few points were left off. For instance, many people remembered the context of the input, such as “time since 8am,” but left off the units, hours.

Problem 3: For part (a), the primary error lie in the units of the rate of change. Recall that the units of the slope (or, as we learned in class on Friday, the average rate of change) are always: unit of output per single unit of input. Thus, the needed units in part (a) were days per year. The slope should have been rounded to 3 decimal places for use in the model. For part (b), full credit rested on successfully constructing the linear model by hand, and remembering the four parts of a complete model.

Problem 4: The primary error made was in finding the term \(b\) for the model: Since this was an increasing situation, the formula for finding \(b\) is: \(b = 1 + \text{(constant \% change in decimal form)} = 1.126\).

Problem 5: Most of the errors in this problem were not in calculations, but instead in notation. Points were deducted if the function was not named \(D(p)\) (most of the time I won’t count off for such things, but this case is different since the directions specifically state to name the model \(D(p)\)). Also, since the function was named \(D(p)\), this means that the input variable has to be named \(p\), instead of \(x\). In part (b), many people got the correct answer, but forgot to interpret the problem. For an example of more problems like this, see section 1.1 (or, for example, Quiz #1).

Problem 6: The most common exclusion here was forgetting the context for the input. Many had “where \(x\) is in seconds”, which is correct. However, context here is needed, as seconds make
little sense on their own: “since the start of the exam” or “after \( x \) seconds” or “\( x \) seconds into the exam” was needed for full credit. On part (b), there were a few cases of writing that one of the limits was \( L \). This is certainly correct for a general logistic model, however, it was asked about a specific model. In other words, I wanted you to show me that you knew which term \( L \) was. Since this was a minor error, it was only worth one point.

**Problem 7:** This was easily the best problem, grade-wise. There were not many specific mistakes made on this one (i.e. most of the mistakes were of the general nature and are listed above).

**Problem 8:** The primary mistake on this problem was in thinking that “time” by itself can be an input value for an equation. Unfortunately, this is not the case, as “11:15”, for example, is not a number on its own. The first step to correcting this was making the input units and the context “where \( x \) is hours since 8am”. This avoids the problem completely, and was the best way to do it. Another common mistake was to translate time directly into a decimal as-is: 11:15=11.15, for example. However, this is not true. 11:15 is actually equivalent to the number 11.25, since 15 minutes is 25\% of an hour, or .25 of an hour (instead of 15\% of an hour). If we are talking about hours since 8am (or some similar alignment), as in the exam, 11:15 would be written as 3.25 hours past 8am.