Math 4303 | **FUNDAMENTALS OF MATH** | Fall 2013

Dr. Duval | **Homework**

Thursday, October 3

Follow the separate general guidelines for Parts A,B,C. Be sure to include and label *all four* standard parts (a), (b), (c), (d) of Part A in what you hand in.

Analyzing real functions

Section 3.2.1

A: Reading questions. Due by 3pm, Wed., 9 Oct.

1. Describe, in your own words, the difference between "Type 1" functions, and "Type 2" functions. Give two examples of each, and explain why each one has the type you say it does.
2. Repeat the exercise in the subsection titled "Finding values of real functions" for the function $f(x) = \sqrt{x}$ with $x = 2$. [There may not be an exact analogue for each of the steps 1.–4. in the exercise; on the other hand, you may also think of other ways to think about $\sqrt{2}$ that wouldn't apply to $\sin(\frac{2\pi}{5})$.]
3. The textbook claims (on p. 89) that "the Vertical Line Test is not true if the graph is in polar coordinates", and that this is illustrated by Figures 11b, 12b, and 13b. Explain this in a little more detail: Why do these figures show the Vertical Line Test failing in polar coordinates?
4. Example 1 has the restriction $m > 0$. Which of the characteristics discussed in this example change if we instead insist $m < 0$? What happens if $m = 0$?

B: Warmup exercises. For you to present in class. Due by end of class Thu., 10 Oct.

3.2.1 Problems: 4, 5, 9.

Composition and inverse functions

Section 3.2.2

A: Reading questions. Due by 3pm, Mon., 14 Oct.

1. In the final paragraph of the subsection "Reasons to consider function composition", the textbook claims that composition of functions is an important tool in situations including the chain rule for differentiation in calculus. State the chain rule, and explain carefully how it relates to composition of functions. Include an example to make your explanation more clear.
2. What is the geometric relationship between the graph of a real function, and the graph of its inverse? Show how this works with $f(x) = x^3$.
3. What difficulty do we encounter when trying to define the inverse function to a trigonometric function? Illustrate this difficulty, using both a graph and a table, for the cosine function. How do we get around this difficulty?
4. The textbook claims, on p. 98, that properties (3) and (4) follow from the properties in (2). Show how this is so; in other words, show how to derive (3) and (4) from (2).
5. Give an example showing how to use the change of base formula for logarithms on p. 99.

B: Warmup exercises. For you to present in class. Due by the end of class Tue., 15 Oct.

3.2.2 Problems: 1, 2, 8, 9.