

Mathematics 1100Y – Calculus I: Calculus of one variable

TRENT UNIVERSITY, Summer 2012

Assignment #9

It's a mad, mad world!

Due on Wednesday, 18 July, 2012.

In a certain part of Wonderland, all creatures are either mad, in which case they believe exactly those things which are false, or sane, in which case they believe exactly those things which are true. The Duchess and Alice discuss problems about such creatures below...

THE CATERPILLAR AND THE LIZARD.

“Well,” replied the Duchess, “take, for example, the Caterpillar and Bill the Lizard. The Caterpillar believes that both of them are mad.”

“Which of them is really mad?” asked Alice.

“I shouldn't have to tell you *that!*” replied the Duchess. “I have given you enough information for you to deduce the answer.”

1. Is the Caterpillar mad or sane? And what about the Lizard? Explain your reasoning!
[5]

WHAT ABOUT THESE THREE?

“I've always wondered about the March Hare, the Hatter, and the Dormouse,” said Alice. “The Hatter is *called* the Mad Hatter, but is he really mad? And what about the March Hare and the Dormouse?”

“Well,” replied the Duchess, “ the Hatter once expressed the belief that the March Hare does not believe that all of them are sane. Also, the Dormouse believes that the March Hare is sane.”

2. What can you deduce about these three? Explain your reasoning! [5]

NOTE. These problems were stolen from — er, creative inspiration was provided by — Raymond Smullyan. If you like this sort of thing, check out his books *Alice in Puzzleland* and *What is the name of this book?*