Mathematical Analysis **G12MAN** **2008/9**

Feedback on Assessed Coursework 1

Common errors, pointers for improvement, and other comments

Overall, the results on this coursework were good. The feedback below is based on comments passed to me by the postgraduate markers. This agrees with what I saw on the scripts that I looked through.

1. (a) This part was mostly well done. There were some slips with the endpoints of intervals, and occasionally one or two features of these sets (such as their infinite extent) was unclear. Also, sometimes some of the working in identifying sets C and D was missing, unclear or inaccurate.

   (b) This part was mostly very well done. However, some students incorrectly said that one or both of the sets B and D were bounded. Note that, in $\mathbb{R}$, B and D are bounded below but **not** bounded above.

2. This question caused more difficulty, but there were many excellent answers.

   Many of the problems involved missing or incorrect quantifiers: $\exists$ ('there exists') and $\forall$ ('for all'). This affected, for example, the following: the statement and use of the definition of bounded, which needs '$\exists R > 0$'; saying that a property held for ALL elements of the set A needs '$\forall \boldsymbol{x} \in A$'.

   Other problems involved missing or unclear English. You need to express your reasoning clearly and correctly using 'hence', 'thus', 'then', 'let', 'set', 'first', 'next', etc.

   Some students were confused between $\subseteq$ (subset of) and $\in$ (element of). It is important for you to distinguish between these, as you may otherwise be led into more serious errors.

   Some students claimed that $\max\{R_1, R_2\}$ would be enough, when you actually need $R_1 + R_2$. In any case, the justification for the claim or claims made was often unsatisfactory or missing.

3. (a) Many students lost marks by not including enough detail/explanation/justification here. In particular, many students did not describe the curves as hyperbolae, and said nothing about the asymptotes. Some said that the curves were parabolas.

   (b) Most students did very well on this part. However, some students thought that S was bounded, some thought that the hyperbola $y^2 - x^2 = 1$ was included in $\mathrm{int}(S)$, and some students thought that the hyperbola $y^2 - x^2 = 4$ was included in $\mathrm{nint}(S)$. Some students had difficulty in using set notation correctly to define the sets in parts (ii) and (iii).

4. There was some good work here, but there were quite a few problems.

   Some students tried to show that the statement was false by giving an incorrect counter-example.

   Some students tried to prove that the statement was true by giving a particular example for which the statement was correct. This does not help to prove that the statement is true in general.

   Some students only proved a set inclusion in one direction, and then claimed that equality followed. (The reverse set inclusion was needed too.)

   Some students tried to prove directly that $x \in$ LHS $\Leftrightarrow x \in$ RHS, using $\Leftrightarrow$ throughout. It is very hard to make this work convincingly here, and it is probably best not to try.

   As in question 2, there were some problems with unclear expression.