

Midterm Test

Marking Scheme and TA Comments

Question 1

- 1) If there was anything wrong with the mantissa, the exponent or the sign, I took off one point. Such errors could arise if they did the multiplication/addition incorrectly or if their rounding of the final answer is wrong.
 - 2) Some students multiplied numbers in a way that is similar to adding numbers. That is, they made the exponents the same and then did the multiplication. I did not take off any point for this, but, if their final answer was wrong (as it was in most cases), I did not give any point for that part.
 - 3) In part e, some students wrote a number instead of NaN. I took off one point for this error.
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Question 2

- a) Most students identified that a sufficiently small x would lead to a large relative error. If they noted this, but then chose an x that is not small enough, they got 3-4 marks, depending on what was said. If they chose an incorrect x , but then computed the relative error correctly, they got 1-2 marks, depending on what was said.
 - b) 3 marks for the correct formula.
(1 mark if they found a reasonable alternative formula, but it still had the cancellation problem)

2 marks for the proof that it had small relative error, even if formula was wrong
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Question 3

- Most of the students are doing quite well on this question.
- A few students forgot to take the absolute value on each entry before they substitute them into formulas for the norms, especially for the matrix norms.
- A few students mixed up the formula for the infinity norm and the one norm for matrices.
- A few students forgot to take the square root when calculating the 2-norm of a vector.

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Question 4

- * 4/5 if proof didn't include case $x = 0$;
- * 3/5 if condition is switched from $x \neq 0$ to $\|x\| = 1$ and invalid solution;
- * 2/5 if the student attempted something but was off track;
- * 1/5 if the student was just off track from the beginning;
- * In some very rare cases, 1 additional mark was taken off if the notation was not consistent and made the proof very hard to follow.

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