

PMAT 435 (Spring 2008) Final Exam Information

The three hour final exam will be held on June 27, 2008 from 7:00 pm to 10:00 pm. in MS 527. You will be given ten questions and you choose to answer any EIGHT of them.

Question 1 (50 marks)

You will be asked to define five terms. Accuracy is extremely important. Most probably you will be awarded either 10 marks or 0 marks for each term you define. In other words, credits will not be given unless your answer is essentially perfect. The five terms will be taken from the following list:

Definition (a): From

Section 8: countable sets, uncountable sets.

Section 12: upper bound, lower bound, supremum, infimum

Definition (b): From

Section 13: interior points, boundary points, open sets, closed sets, accumulation points, closure.

Section 14: open cover, compact sets

Definition (c): From

Section 16: limit of (convergent) sequences

Section 18: monotone sequences, Cauchy sequences

Section 19: subsequences, subsequential limits, limit superior, limit inferior

Definition (d): From

Section 20: limit of a function at a point

Section 21: continuity of a function at a point

Section 23: uniform continuity of a function on a set

Definition (e): From

Section 25: the derivative of a function at a point

Section 29: the Riemann integral

My general policy on your use of terms in definitions: If in your definitions you make use of any other “non-obvious” term we discussed in this course (whether it is on the above list or not), you need to provide the definition for it too! For instance, if you define “countable sets” to be sets that are either finite or denumerable, then you will need to define “denumerable sets” as well. However, you don’t need to define “finite sets” as I consider its meaning rather “obvious”. Also, you do not need to go beyond one level of clarification. For instance, in the example we are just now discussing, if you say a set is denumerable if there is a bijective function from that set onto the set of all positive integers, you don’t need to further define “bijective functions”. The idea is that I do not want you to get away by defining a term using another term without actually showing me that you do know their meanings, but then I do not want to overload you with too many layers of clarifications either. The rule of thumb is that, you earn marks in a “fair” way.

Question 2 (50 marks)

You will be asked to state (without proof) five theorems. Once again, accuracy is extremely important. Most probably you will be awarded either 10 marks or 0 marks for

each theorem you state. In other words, credits will not be given unless your answer is essentially perfect. The five theorems will be taken from the following list:

- p.139 Heine-Borel Theorem
- p.141 Bolzano-Weierstrass Theorem
- p.175 Monotone Convergence Theorem
- p.177 Cauchy Convergence Criterion
- p.211 Intermediate Value Theorem
- p.243 Mean Value Theorem
- p.246 Inverse Function Theorem
- p.260 Taylor's Theorem
- p.286 The Fundamental Theorem of Calculus I
- p.288 The Fundamental Theorem of Calculus II

Question 3 (50 marks)

You will be given five statements, and you will be asked to determine whether or not they are true. You are also required to give concise justifications for your answers. The statements will be taken from these questions:

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|-----------|-------|-----------|-------|
| p.187-188 | #19.1 | p.197 | #20.1 |
| p.206-207 | #21.1 | p.248 | #26.2 |
| p.275 | #29.2 | p.283-284 | #30.1 |

Question 4 (50 marks)

This is one of the questions from Assignments 2, 3, 4.

Question 5 (50 marks)

This is one of the questions from Tutorials 3, 4, Quizzes 5, 6, 7.

Question 6 (50 marks)

This is one of the questions from Tutorials 5, 6, Quizzes 8, 9, 10.

Question 7 (50 marks)

You will be asked to prove one of the following theorems: p.132 Theorem 13.10, p.141-142 Theorem 14.6, p.162-163 Theorem 16.14.

Question 8 (50 marks)

You will be asked to prove one of the following three results: (1) p.193 Theorem 20.8, (2) p.210-211 Lemma 22.5 and Theorem 22.6 as one result, (3) p.242-244 Theorem 26.2 and Theorem 26.3 as one result.

Question 9 (50 marks)

You will find out all about it at the time of the Final Exam.

Question 10 (50 marks)

You will find out all about it at the time of the Final Exam.