

MA 2560: Calculus II (Spring 2009) Review for Exam 3

Exam 3 covers material from sections 11.1–11.4 and 12.1–12.6. However, the exam will be weighted slightly more towards the Chapter 12 topics. Material covered on the previous exam is also fair game. This review will give you a good indication of what you will be expected to know for the exam. However, you should not expect the exam to be identical to the questions given here. I will not collect this review; do what you want with it.

Topics

To be successful on Exam 3 you should

- understand parametric equations
- be able to find the direction of a parametric curve
- be able to convert from parametric form to rectangular form by eliminating the parameter
- be able to find dy/dx for a pair of parametric equations (in particular, you should be able to find horizontal and vertical tangents)
- be able to find the equation of the tangent line to a parametric curve for a given value of t
- be able to find area, arc length, and surface area for problems involving parametric curves
- understand the polar coordinate system
- be able to convert back and forth from polar form to rectangular form (in particular, you should know: $x = r \cos \theta$, $y = r \sin \theta$, $x^2 + y^2 = r^2$, $\tan \theta = y/x$)
- be able to sketch the graph of a polar equation by hand and with your graphing calculator (in particular, you should be able to determine a smallest interval of θ that traces out the graph of a polar equation once)
- be able find points of intersection of two polar graphs
- be able to find area and arc length for problems involving polar equations
- know the definition of a sequence
- understand the notation of sequences
- be able to find the limit of a sequence
- understand what increasing, decreasing, monotone, and bounded sequences are and be able to determine whether a given sequence has one of these properties
- know statement of and understand the Monotonic Sequence Theorem
- know the definition of a series
- understand the notation of series

- understand what the sequence of partial sums is for a given series and be able to find its limit in reasonable situations (in particular, know how to find the limit of the sequence of partial sums for a telescoping series)
- understand what it means for a series to converge/diverge
- know what a geometric series is, when it converges/diverges, and what it converges to if it converges
- know what the harmonic series is and know that it diverges
- know the Test for Divergence and be able to apply it appropriately
- know the Integral Test and be able to apply it appropriately
- know what a p -series is and it converges/diverges
- know the Direct Comparison Test and be able to apply it appropriately
- know the Limit Comparison Test and be able to apply it appropriately
- know the Alternating Series Test and be able to apply it appropriately
- know that the alternating harmonic series is and that it converges
- know what it means for a series to be absolutely convergent
- know what it means for a series to be conditionally convergent
- be able to provide an example of a series that is conditionally convergent
- know the Ratio Test and be able to apply it appropriately
- know the Root Test and be able to apply it appropriately

Words of advice

Here are a few things to keep in mind when taking the exam:

- Show all work! The thought process and your ability to show *how* and *why* you arrived at your answer is more important to me than the answer itself. For example, if you have the right answer, but your reasoning is flawed, then you will lose most of the points.
- The exam will be designed so that you could complete it without a graphing calculator. If you find yourself using your calculator a lot on a given question, then you may be doing something wrong.
- Make sure you have answered the question that you were asked. Also, ask yourself if your answer makes sense.
- If you know you made a mistake, but you can't find it, explain to me why you think you made a mistake and tell me where the mistake might be. This shows that you have a good understanding of the problem.
- If you write down an "=" sign, then you better be sure that the two expressions on either side are equal. Similarly, if two things are equal and it is necessary that they be equal to make your conclusion, then you better use "=".
- Don't forget to write limits, integral symbols, $+C$, \sum , etc. where they are needed.

- Both of us should be able to read what you wrote. Your work should be neat and organized! In general, your work should flow from left to right and then top to bottom (just like if you were reading). Don't make me wander around the page trying to follow your work.
- If your answer is not an entire paragraph (and sometimes it may be), then your answer should be clearly marked.
- Ask questions when you are confused. I will not give away answers, but if you are confused about the wording of a question or whether you have shown sufficient work, then ask me.

Exercises

One of the best things you can do is look over or repeat the homework for the corresponding sections (or possibly do the problems for the first time if you never did them in the first place). Here are a list of problems that you can focus on. Most of them are odd exercises that I assigned for homework.

I'm hoping that you will talk amongst each other to determine if you are doing them correctly. Of course, if you have questions, then I will answer them.

1. Exercise 7, page 662
2. Exercise 11, page 662
3. Exercise 37, page 663
4. Exercise 17, page 672
5. Exercise 25, page 672
6. Exercise 33, page 673
7. Exercise 41, page 673
8. Exercise 59, page 674
9. Exercise 17, page 684
10. Exercise 19, page 684
11. Exercise 23, page 684
12. Exercise 49, page 684
13. Exercise 37, page 689
14. Exercise 17, page 689
15. Exercise 23, page 689
16. Exercise 37, page 689
17. Exercise 5, page 720
18. Exercise 13, page 720
19. Exercise 19, page 721
20. Exercise 29, page 721

21. Exercise 42, page 721
22. Exercise 9, page 730
23. Exercise 17, page 730
24. Exercise 35, page 730
25. Do as many of the exercises on page 758 as you'd like. This will give you practice on deciding what test to use. In fact, you may benefit from reading Section 12.7 (it's very short and reinforces all of the things that I've been saying in class). Note: on the exam, you will be asked to state what test you are using. Also, you really do need to verify all of the necessary hypotheses.
26. Exercise 3, page 755
27. Exercise 4, page 755
28. Exercise 5, page 755
29. Exercise 27, page 756