Updated: April 12, 2014

Review For Exam 2

The directions for the exam are as follows:

"WRITE YOUR NAME CLEARLY. Do as many problems as you can for a maximal score of 100. SHOW YOUR WORK!"

1. The exam consists of 10 core problems and 2 extra-credit problems. If you wish, you can do all the 12 problems, but your score will only add up to 100 points. Partial credit will be given.

2. You are allowed to use a scientific calculator. Don't forget to bring it

3. When you are studying for this exam, be sure to work through sections that you know least of all first.

4. Odd exercises have solutions at the back of your textbook.

Warning! Be sure to work on ALL exercises below that are marked in red as well as exercises that are explicitly written out in the review sheet. 100% of regular exam questions will consist of a subset of such problems. Do ALL the problems on the review list to insure a perfect mastery of the topic.

Section 7.8

- Be able to determine whether an integral is improper. Decide when an improper integral is convergent and when it is divergent. Whenever possible, find the value of the integral (P. 527, Exercises **5-39** [odd])
- Be able to use comparison test for integrals to check for convergence (P. 528, Exercises **49-54**)
- Answer the following 2 exercises (P. 528, **60, 61**)

Section 8.1

- Find the exact length of the curve (P. 543, Exercises **7-17** [odd]).

Section 8.2

- Find the exact area of the surface (P. 550, Exercises **5-11** [odd]).

Section 11.1

- Know how to find a formula for the general term of a sequence from the pattern you are presented with (P. 700, Exercises **13-18**)
- Determine the limit of the sequence if it exists. (P. 700, Exercises **23-55** [odd]).
- Determine whether given sequence is monotonic and bounded. (P 701, Exercises **73, 75, 77**)

- Be able to use the monotone convergence theorem to find limits of monotone, bounded sequences (P. 701, Exercises **79-81**)
- Calculate the following limits:
  (a) $\lim_{n\to\infty}\left(1+\frac{1}{n}\right)^n$
  (b) $\lim_{n\to\infty}\left(1+\frac{4}{n}\right)^n$
  (c) $\lim_{n\to\infty}\left(1-\frac{2}{n}\right)^n$
  (d) $\lim_{n\to\infty}\left(1+\frac{x}{n}\right)^n$
  (e) $\lim_{n\to\infty}\left(1+\frac{1}{n^2}\right)^n$
  (f) $\lim_{n\to\infty}\left(1+\sin\left(\frac{\pi}{n}\right)\right)^{\frac{2}{\sin\left(\frac{\pi}{n}\right)}}$
  (g) $\lim_{n\to\infty}\left(1+\sin\left(\frac{\pi}{n}\right)\right)^n$
- **Possible Extra-Credit:** Establish the identity $\lim_{h\to 0}(1+h)^{1/h}=e$ from your knowledge of the derivative of $\ln(x)$.

Section 11.2

- Be able to identify convergent geometric series and find their sum (P. 711, Exercises **17-25** [odd]).
- Determine whether the given series is convergent or divergent. Find the sum for convergent series (P. 711, Exercises **27-47** [odd]).
- Be able to express a number represented by repeating decimals as a ratio of integers (P. 712, Exercises **51-56**).
- **Possible Extra-Credit:** Establish criteria for convergence of geometric series. If a geometric series is convergent, show how to compute its sum. Justify your calculations (i.e. show me that you understand and haven't simply regurgitated the information back at me).
- **Possible Extra-Credit:** A certain ball has the property that each time it falls from a height h onto a hard, level surface, it rebounds to a height rh, where $0 < r < 1$. Suppose that the ball is dropped from an initial height of H meters. Assuming the ball continuous to bounce indefinitely, find the total distance it travels.

Section 11.3

- Be able to use the integral test to determine convergence or divergence of series (P. 720, Exercises **3-25** [odd]).
- Identify all values of p, for which the given series will be convergent (P. 721, Exercises **29-32**).
- Be able to use your knowledge of the sum of a series to determine the sum of a similar series (P. 721, Exercises **34, 35**).
- **Possible Extra-Credit:** State and prove the integral test.

Section 11.4

- Understand and be able to use the comparison and limit comparison tests (P. 726, Exercises **1-31** [odd]).
- **Possible Extra-Credit:** State and prove the comparison test.
- **Possible Extra-Credit:** State and prove the limit comparison test.
- **Possible Extra-Credit:** Solve Exercises **37-41** on page 727 for deeper understanding of the comparison and limit comparison tests.

Section 11.5

- Be able to use the alternating series test to determine convergence or divergence of series (P. 731, Exercises **1-19** [odd]).
- **Possible Extra-Credit:** State and prove the alternating series test.
- **Possible Extra-Credit:** Establish the alternating series estimation theorem (P. 730)

Section 11.6

- Be able to use the ratio, root, and absolute convergence tests to determine convergence or divergence of series (P. 737-738, Exercises **1-29** [odd]).
- **Possible Extra-Credit:** State and prove the absolute convergence test.
- **Possible Extra-Credit:** State and prove the ratio test.
- **Possible Extra-Credit:** State and prove the root test.

Section 11.7

- Be able to use everything you learned to test for convergence or divergence of series (P. 740-741, Exercises **1-37** [odd]).