

## Assignment 8: Taylor Series and Taylor Polynomials Week 12

**Mid-Semester Reflections:** Revised DUE Date [12:00 midnight Tuesday, April 13](#)

Very few of you sent me your Mid-Semester Reflections last week. Please complete these reflections, and upload them to your folder for this course in Educator by Tuesday night at midnight. I will summarize your reflections and respond to your feedback in class on Wednesday, April 14. It would be possible to make some changes in how we use class time for the remaining weeks of the semester based on your feedback.

Please review the course content and objectives, which are listed on the Syllabus. Considering these objectives and the expectations you had when you signed up for this course:

1. What is your sense of the progress you are making in meeting the course objectives?
2. What aspects of the course do you feel are working well for you? What do you feel is working poorly?
3. Which (one or two) of the assignments or class activities has been the most helpful for you in terms of understanding and meeting the course objectives? In what way has this assignment or project been helpful?
4. Identify two or three things that you can do which would help you to meet the course objectives.
5. In what way(s) could Sister Barbara help you to do the things you identify in item 4?
6. Do you have any suggestions for changes that we could try – in the way we use class time, in the class activities and homework assignments, in any other aspect of the course – which might help to make this an even better course for you?

Please type up your responses in Word, and upload this document to your folder for this course in Educator. Please consider this an individual assignment, not a group assignment. I am interested in hearing what each of you has to say about how this course is going – and how we can make it even better for you.

**In class on Wednesday, [Day 32]:**

- Discussion of suggestions from your mid-semester reflections.
- Lecture over important ideas of Section 10.3: Taylor Series
- Homework: Study Section 10.3, and work through the Activities and Checkpoints.

**New Web Work problem sets are available.**

- Web Work problems sets Ch10\_Limits (A – E) are available now, and due April 23. Working on these problems will help you begin to prepare for Benchmark #3, which will be given in class on Monday, May 3.
- To get credit for these problem sets, you need to complete 80% of these problems correctly.

**In class on Friday, [Day 33]:**

- Lecture over important ideas of Section 10.4: More Taylor Polynomials and Series
- Group work on Activities and Checkpoints of Sections 10.3 and 10.4
- Homework: Study Sections 10.3 and 10.4, and work through the Activities and Checkpoints.

**In class on Monday, [Day 34]:**

- More examples, discussion, and group work on selected exercises from Sections 10.3 and 10.4.

## Lecture / Discussion Notes for Assignment 8 [Day 32]: Taylor Series and Taylor Polynomials

### Mid-Semester Reflections:

- Things that work well: [Note: Student comments are in black, and my responses are in blue.]
  - “Web Work problems, having set deadlines for finishing exercises and Web Work problem sets” **My response:** I will continue to develop helpful Web Work problem sets.
  - “Group work in class, large and small group discussions – I get to bounce my ideas off of others, and get different perspectives”
  - “The 1<sup>st</sup> project (Sky Diving Project) – it was difficult, so I had to collaborate with others; this helped me improve communication skills, and to be more productive”
  - “The 2<sup>nd</sup> project (Crater Lake), because it showed how some of the things we learn in class can be applied in situations in real life”
  - **My response:** The 4<sup>th</sup> project will give you a chance to apply the idea of geometric series to the Drug Dosage Problem of Project 3.
- Things that work poorly:
  - “We don’t get enough practice problems; we need more homework, and then put the homework on the board”
  - “We need homework / practice problems that are more like test questions”
  - “Benchmarks – I just can’t seem to pass them on the first attempt!”
  - **My response:** I will plan for more homework problems and class discussion on benchmark-like questions before the next benchmark. Our current schedule includes 5 – 6 days when I will not be introducing new material, and I will plan for one of these before the next benchmark.
  - **My response:** My goal as the teacher is that you learn to solve apply what we are learning in class to new problems. We need both computational skill development, and understanding of why we need to do these computations.
- What do you need to help you be more successful in this class:
  - “I need help with learning to understand the concepts, rather than merely mimicking the techniques.”
  - “We need more opportunities to attempt problems solo and then get feedback.”
  - “We need more homework with feedback.”
  - “We need more problems presented on the board, and more take home problems to present and discuss in class.”
  - “More specific problems on test review days”

### In class on Wednesday, April 14:

- Discussion of suggestions from your mid-semester reflections. (See above.)
- Lecture over important ideas of Section 10.3: Taylor Series
- Homework: Study Section 10.3, and work through the Activities and Checkpoints.

### New Web Work problem sets are available.

- Web Work problems sets Ch10\_Limits (A – E) are available now, and due April 23. Working on these problems will help you begin to prepare for Benchmark #3, which will be given in class on Monday, May 3.
- **To get credit for these problem sets, you need to complete 80% of these problems correctly. Specifically: 80% of the possible points → 9 points; 90% or more → 10 points**

### Lecture Notes

- Limits: what taking the limit means + strategies for calculating limits
  - Limiting behavior has to do with what is going on “in the neighborhood” or “as  $x$  approaches” a particular value. So we can’t just calculate one value, we have to think about the whole picture.
  - Strategies:

- Try plugging in the value – this works if the function is *continuous* and *defined* at that point.
- Do some algebra to simplify the expression, and see if we can eliminate the problem.
- Try looking at the graph – we are looking for *holes*, *jumps*, *vertical asymptotes*
- In thinking about limits as  $x \rightarrow \infty$ , we are asking about the “ultimate value” of the function. Is there a *ceiling* (upper bound) or a *floor* (lower bound) to the function values?
- For limits as  $x \rightarrow \infty$  in a rational function, it is sufficient to look at the highest-power term in the numerator divided by the highest-power term in the denominator.
- If the numerator is a number not 0, and the denominator  $\rightarrow \infty$ , the fraction  $x \rightarrow 0$ .
- If the numerator is a number not 0, and the denominator  $\rightarrow 0$ , the fraction  $x \rightarrow \infty$ .
- But for the fraction  $\frac{0}{0}$ , the limit can be anything – we need to do more work!
- Some examples: Web Work, Ch\_10-limits\_A
- Section 10.3.2: Sequences and Series:
  - Sequences and Series: definitions of terms
  - Example 1: sequence of term, sequence of partial sums, sum of the series
  - A sequence of partial sums is another sequence.
  - The function  $f(x) = \left(\frac{1}{2}\right)^x$  and the sequence  $\left(\frac{1}{2}\right)^k$ ; the graph of the function, and the graph of the sequence
- Taylor Series for  $e^x$
- Taylor Series for  $\sin(x)$
- These two polynomials were developed at  $x=0$ . What happens if we evaluate them at  $x = 2$  or at  $x = -\frac{\pi}{2}$ . See Section 10.3.1, and then do Activity 1 together.