

Math 76 Assessment 15 §5.5, 5.6 Absolute and Conditional Convergence; Ratio and Root Tests

Things to remember:

1. The problem to complete is shown below. Write your name and solution on the next page where instructed.
2. Please make sure your full name is written neatly in the box.
3. Your score will be determined by **Mechanics** (2 points) and by **Content** (3 points).
4. The following rubric will be used for **Mechanics**:

Clear neat work, steps in order and easily followed, proper use of notation	2
Mostly clear work; minor errors in notation or skipped steps	1.5
Steps/handwriting hard to follow/read; major errors in notation	1
No discernible or relevant work, or work impossible to read/follow	0

5. You are not allowed to consult outside sources, including notes, books, the internet, or other people, while taking this assessment. Calculators are allowed only for basic numerical or scientific computations, not for graphing or algebra.
6. If you need more room, you may finish on a plain piece of paper or blank document. If you do all your work on separate sheets, please **copy the problem** and make sure to write **Version B** at the top of the first page.
7. When you are finished, create a legible, well-lit **.pdf file** of your work and upload it to Assessment 15 on Gradescope. Please follow the directions to **assign the page(s)** of your submission that contain your work for the question. More info about submitting to Gradescope:

<http://bit.ly/gradescope-help>

Evaluate the series $\sum a_n$ on the next page.

Your solution should include:

- (0.5 point) Statement of the test(s) to be used and an explanation of why the test(s) is/are valid for the series;
- (1.5 point) Correct computations and reasoning explaining how the test(s) is/are carried out;
- (1 point) Correct conclusion ($\sum a_n$ converges absolutely/converges conditionally/diverges), with explanation.

Assessment 15

Full Name:

Tyler Gillette

Version B

Follow the directions on the previous page. Assume m is an unknown constant greater than 1.

Let

$$a_n = \frac{(-1)^n(5n^2 - 3)}{m^{7n+1}}.$$

Determine whether the series $\sum_{n=4}^{\infty} a_n$ converges absolutely, converges conditionally, or diverges.

Ratio test

$$\lim_{n \rightarrow \infty} \frac{|a_{n+1}|}{|a_n|} = L$$

$L < 1 \rightarrow$ converges Absolutely

$L > 1 \rightarrow$ diverges

$$a_n = \frac{(-1)^n(5n^2 - 3)}{m^{7n+1}}$$

$$a_{n+1} = \frac{(-1)^{n+1}(5(n+1)^2 - 3)}{m^{7n+2}}$$

$$= \frac{(-1)^{n+1}(5(n+1)^2 - 3)}{m^{7n+2}} \cdot \frac{m^{7n+1}}{(-1)^n(5n^2 - 3)}$$

$$= \lim_{n \rightarrow \infty} \frac{(-1)^1(5(n+1)^2 - 3)}{m^1(5n^2 - 3)}$$

$$= \lim_{n \rightarrow \infty} \frac{5n^2}{5mn^2}$$

$$= \lim_{n \rightarrow \infty} - \frac{1}{m}$$

M is a real number greater than 1
which means $L = -\frac{1}{M}$ is less than
1 and will converge absolutely by
The ratio test.