

MATH 142: Exam 2

Name: _____

Fall —₂ 2025

10/23/2025

75 Minutes

Write your name on the appropriate line on the exam cover sheet. This exam contains 9 pages (including this cover page) and 8 questions. Check that you have every page of the exam. Answer the questions in the spaces provided on the question sheets. Be sure to answer every part of each question and show all your work. If you run out of room for an answer, continue on the back of the page — being sure to indicate the problem number.

Question	Points	Score
1	20	
2	10	
3	10	
4	10	
5	10	
6	10	
7	10	
8	10	
Total:	90	

1. (20 points) Showing all your work and fully justifying your reasoning, determine whether the following series is divergent, conditionally convergent, or absolutely convergent.

$$\sum_{n=1}^{\infty} (-1)^n \frac{\sqrt{n}}{n+1}$$

2. (10 points) Showing all your work and fully justifying your reasoning, determine whether the following series diverges or converges. If the series converges, find its sum:

$$\sum_{n=1}^{\infty} \frac{(-2)^{n+1}}{3^{2n}}$$

3. (10 points) Showing all your work and fully justifying your reasoning, determine whether the following series converges or diverges:

$$\sum_{n=1}^{\infty} \frac{n+5}{\sqrt{9n^4 - 3}}$$

4. (10 points) Showing all your work and fully justifying your reasoning, determine whether the following series converges or diverges:

$$\sum_{n=1}^{\infty} \left(\frac{4n^2 + 7}{3n(n+1)} \right)^n$$

5. (10 points) Showing all your work and fully justifying your reasoning, determine whether the following series converges or diverges:

$$\sum_{n=1}^{\infty} \frac{n^2 + 3n - 1}{5n^4 - 3n + 2}$$

6. (10 points) Showing all your work and fully justifying your reasoning, determine whether the following series converges or diverges:

$$\sum_{n=0}^{\infty} \frac{n 3^n}{(2n)!}$$

7. (10 points) Showing all your work and fully justifying your reasoning, determine whether the following series diverges or converges. If the series converges, find its sum:

$$\sum_{n=1}^{\infty} \left(\frac{1}{n+1} - \frac{1}{n+2} \right)$$

8. (10 points) Showing all your work and fully justifying your reasoning, determine whether the following series converges or diverges:

$$\sum_{n=1}^{\infty} \frac{e^n - 1}{e^n + 1}$$