

Math 102, Fall 2021 — Homework 3

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Due September 22 at 5:00 pm

Instructions. This homework, like most others this semester, has two parts. One part is on Webwork, and the other part is some problems that you will write solutions to by hand and submit on Gradescope.

Webwork

See [Webwork](#) for a set of problems from Section 9.4.

Written problems

Write up solutions to the following problems, making sure to show your work, write neatly, scan clearly, and generally follow the [guidelines for writing good homework solutions](#). You should submit solutions on [Gradescope](#).

Problem 1. For each of the following series, first make a conjecture about whether it converges or diverges. Second, justify your conjecture using the Comparison Test.

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

Problem 2. For each of the following series, first make a conjecture about whether it converges or diverges. Second, justify your conjecture using the Limit Comparison Test.

1. $\sum_{n=1}^{\infty} \frac{n+1}{n^3+6}$
2. $\sum_{n=1}^{\infty} \frac{1}{\sqrt{n^2(n+2)}}$
3. $\sum_{n=1}^{\infty} \frac{n}{\cos n+n^2}$

Problem 3. For each of the following series, first make a conjecture about whether it converges or diverges. Second, justify your conjecture using either the n th term test, the comparison test, the limit comparison test, or your knowledge of geometric series.

1. $\sum_{n=1}^{\infty} \frac{5n+2}{2n^2+3n+7}$
2. $\sum_{n=1}^{\infty} \frac{6}{n+2^n}$
3. $\sum_{n=1}^{\infty} \frac{2n^3-1}{n^3+1}$
4. $\sum_{n=1}^{\infty} \frac{n+2}{n^4+5n^2+1}$
5. $\sum_{n=1}^{\infty} \frac{3^n-n}{4^n}$
6. $\sum_{n=1}^{\infty} \frac{5+e^n}{3^n}$