Name:

NOTE: There are 5 problems on this midterm (total of 6 pages). Use of
calculators to check your work is permitted; however, in order to receive full
credit for any problem, you must show work leading to your answer. You
have 45 minutes to complete this test.

<table>
<thead>
<tr>
<th>Problem</th>
<th>Possible points</th>
<th>Score</th>
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</table>
Problem 1. (20pts) Determine whether the following series converges or diverges. Then, if the series converges, determine whether it converges conditionally or absolutely. Be sure to carefully explain how you reached your conclusions by describing the kind of test your are using, why the test you are using applies, and how you used the test to reach your conclusion.

\[ \sum_{n=1}^{\infty} \frac{2^n + 3^n}{5^n} \]
Problem 2. (20pts) Determine whether the following series converges or diverges. Then, if the series converges, determine whether it converges conditionally or absolutely. Be sure to carefully explain how you reached your conclusions by describing the kind of test you are using, why the test you are using applies, and how you used the test to reach your conclusion.

\[ \sum_{n=1}^{\infty} \frac{2n}{n^2 + 1} \]
Problem 3. (20pts) Determine whether the following series converges or diverges. Then, if the series converges, determine whether it converges conditionally or absolutely. Be sure to carefully explain how you reached your conclusions by describing the kind of test you are using, why the test you are using applies, and how you used the test to reach your conclusion.

\[
\sum_{n=1}^{\infty} \frac{(-1)^n e^n}{e^n + n^3}
\]
Problem 4. (20pts) Determine whether the following series converges or diverges. Then, if the series converges, determine whether it converges conditionally or absolutely. Be sure to carefully explain how you reached your conclusions by describing the kind of test you are using, why the test you are using applies, and how you used the test to reach your conclusion.

\[ \sum_{n=1}^{\infty} (-1)^n \frac{n^2 + 2}{n^3 + 1} \]
Problem 5. (20pts) Determine whether the following series converges or diverges. Then, if the series converges, determine whether it converges conditionally or absolutely. Be sure to carefully explain how you reached your conclusions by describing the kind of test you are using, why the test you are using applies, and how you used the test to reach your conclusion.

\[
\sum_{n=1}^{\infty} \frac{3^n}{n! + \sqrt{n}}
\]