5. [5 points] Consider the improper integral \( \int_1^\infty \frac{2}{3x + 5e^x} \, dx \).

Note that for \( x > 0 \), we have \( \frac{2}{3x + 5e^x} < \frac{2}{3x} \) and \( \frac{2}{3x + 5e^x} < 0.4e^{-x} \).

Use this information together with the (Direct) Comparison Test for Integrals to determine whether \( \int_1^\infty \frac{2}{3x + 5e^x} \, dx \) converges or diverges.

Write the comparison function you use on the blank below and circle your conclusion for the improper integral. Then briefly explain your reasoning.

**Answer:** Using (direct) comparison of \( \frac{2}{3x + 5e^x} \) with the function \( \frac{2}{3x} \), the improper integral \( \int_1^\infty \frac{2}{3x + 5e^x} \, dx \) **Converges**  **Diverges**

Briefly explain your reasoning.

6. [7 points] Consider the series \( \sum_{n=2}^{\infty} \frac{n^2 - n + 2}{4n^4 - 3n^2} \).

Use the **Limit Comparison Test** to determine whether this series converges or diverges.

Circle your answer (either “converges” or “diverges”) clearly.

The series \( \sum_{n=2}^{\infty} \frac{n^2 - n + 2}{4n^4 - 3n^2} \) **Converges**  **Diverges**

Give full evidence to support your answer below. Be sure to clearly state your choice of comparison series, show each step of any computation, and carefully justify your conclusions.