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