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

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

Use this information together with the (Direct) Comparison Test for Integrals to determine whether $\displaystyle\int_1^\infty \frac{2}{3x+5e^x}\,dx$ 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 $\displaystyle\frac{2}{3x+5e^x}$ with the function ____________________,

the improper integral $\displaystyle\int_1^\infty \frac{2}{3x+5e^x}\,dx$ **Converges** **Diverges**

<u>Briefly explain your reasoning.</u>

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

Use the <u>**Limit Comparison Test**</u> to determine whether this series converges or diverges.

Circle your answer (either "converges" or "diverges") clearly.

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

Give <u>full evidence</u> 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.