1. Determine whether the following improper integral converges or diverges.

\[ \int_{100}^{\infty} \frac{8x}{(x-3)(x-7)} \, dx \]

*Hint: You can calculate the antiderivative exactly, but comparison test may be easier!*
2. Determine whether the following sequence converges or diverges.

\[ a_n = \left(1 + \frac{6}{n}\right)^{-7n} \]

*Hint: The formula sheet may be useful here!*

3. Determine whether the following series converges or diverges.

\[ \sum_{k=13}^{\infty} \left( \frac{1}{3^{k+1}} + \frac{5^k}{2^{2k+3}} \right) \]

*Hint: You just need to determine whether the series converges or diverges. You do not need to calculate its value if the series does converge.*