

I. Evaluate the following limits

1. $\lim_{x \rightarrow \infty} \frac{e^x}{4x}$

2. $\lim_{x \rightarrow 0} \frac{\sin(3x)}{2x}$

3. $\lim_{t \rightarrow \infty} te^{-t}$

4. $\lim_{x \rightarrow 0} \frac{e^x - 1 - x}{x^2}$

II. Find the value of $\int_0^{\infty} xe^{-x} dx$ by using parts to find an antiderivative.