

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 integration by parts to find an antiderivative.