ALCULUS I WORKSHEET: logs, exp & resulting fun.

Find the following, each involving logarithm:

i) \( \frac{d}{dx} \ln \left( \frac{x^5}{x^2 + 2x} \right) \) [Hint: simplify then chain]

ii) \( \frac{d}{dx} \ln(\ln x) \)

iii) \( \int_{\frac{1}{e}}^{e} \frac{2}{x} \, dx \) [should be a simple number!]

iv) \( \int \frac{x^2}{x^3 + 8} \, dx \) [Hint: write as \( \int \frac{u'}{u} \, dx \)]

Now for some involving exponential e^x:

v) \( \frac{d}{dx} e^{\sin x} \)

vi) Sketch \( f(x) = xe^{-x} \) by finding extreme points, curvature etc.

\[ f(x) = \]

\[ \int x e^{x^2} \, dx \]