1. Evaluate the following integrals.
   (a) \( \int x \sin 3x \, dx \)
   (b) \( \int 5xe^{2x} \, dx \)
   (c) \( \int \frac{\ln x}{\sqrt{x}} \, dx \)
   (d) \( \int_{\sqrt{e}}^{e} 4x \ln x \, dx \)
   (e) \( \int_{\ln 5}^{\ln 5} xe^{-x} \, dx \)

2. Evaluate the following integrals.
   (a) \( \int x^2 \cos 2x \, dx \)
   (b) \( \int x^2 e^{3x} \, dx \)
   (c) \( \int x^3 \sin x \, dx \)

3. Evaluate the following integrals.
   (a) \( \int x^6 e^x \, dx \)
   (b) \( \int x^5 e^{-x} \, dx \)
   (c) \( \int x^4 \sin 2x \, dx \)

4. Evaluate the following integrals.
   (a) \( \int e^x \sin 3x \, dx \)
   (b) \( \int e^{-x} \cos x \, dx \)
   (c) \( \int \cos (\ln x) \, dx \)
5. Evaluate the following integrals.

(a) \( \int \ln x \, dx \)

(b) \( \int \tan^{-1} x \, dx \)

(c) \( \int \sin^{-1} x \, dx \)

(d) \( \int \sin^2 x \, dx \)

(e) \( \int (\ln x)^2 \, dx \)

6. Evaluate the following integrals.

(a) \( \int x^3 e^{x^2} \, dx \)

(b) \( \int x \sec^2 x \, dx \)

(c) \( \int e^{\sqrt{x}} \, dx \)

(d) \( \int \sin x \cos x \, dx \)