1. Evaluate using integration by parts
   (a) $\int \arctan x \, dx$
   
   (b) $\int \frac{\ln x}{x^2} \, dx$
   
   (c) $\int t^3 e^{t^2} \, dt$. (Hint: Substitute $x = t^2$)
2. (a) Integrate by parts to get a formula for \( \int \sin^2 x \, dx \) which involves \( \int \cos^2 x \, dx \).

(b) Evaluate \( \int \sin^2 x \, dx \), by using part (a) and the identity \( \cos^2 x = 1 - \sin^2 x \).

3. Evaluate the integrals.

(a) \( \int e^{\sqrt{x}} \, dx \) \quad (\textbf{Hint}: \text{Substitute} \ t = \sqrt{x})

(b) \( \int (\ln x)^2 \, dx \).