1. Find the indefinite integrals.
   (a) \( \int \tan^4(x) \sec^4(x) \, dx \)
   (b) \( \int \tan^3(x) \sec^3(x) \, dx \)

2. Find \( \int \sec \theta \, d\theta \). (Hint: multiply the integrand by \( \frac{\sec \theta + \tan \theta}{\sec \theta + \tan \theta} \).)

3. Compute the definite integrals.
   (a) \( \int_0^{\pi/2} \cos(u) \sin(\sin(u)) \, du \)
   (b) \( \int_{\ln 3}^{\ln 8} 4te^{t^2} \sqrt{e^{t^2} + 7} \, dt \)
   (c) \( \int_{-\pi/2}^{\pi/2} e^{x^2+3x^4+7} \cos(x) \sin(\sin(\sin(x)))) \, dx \)
   (d) \( \int_0^1 \frac{e^z + 1}{e^z + z} \, dz \)

4. (a) Find the indefinite integrals.
   i. \( \int \cos^2 \theta \sin^3 \theta \, d\theta \)
   ii. \( \int \cos^3 \theta \sin^2 \theta \, d\theta \)
   iii. \( \int \cos^2 \theta \sin^2 \theta \, d\theta \)
   (b) Come up with a strategy for finding \( \int \cos^m(\theta) \sin^n(\theta) \, d\theta \) for any arbitrary pair of natural numbers \( m \) and \( n \).

5. The rate of growth of a fish population was modelled by the equation
   \[
   G(t) = \frac{60000e^{-0.6t}}{(1 + 5e^{-0.6t})^2},
   \]
   where \( t \) is measured in years and \( G \) in kilograms per year. If the biomass was 25000 kilograms in the year 2000, what is the predicted biomass for the year 2020?

6. Suppose that \( f \) is continuous on \([a, b]\) and differentiable on \((a, b)\). Find \( \int_a^b 2f(x)f'(x) \, dx \).