Homework 1

Task 1:
Evaluate the following integrals:

1. \( \int_{-2}^{3} (x^2 - 3) \, dx \)
2. \( \int_{0}^{\pi/4} \sec^2 \theta \, d\theta \)
3. \( \int_{0}^{\pi/4} \tan \theta \sec \theta \, d\theta \)

Task 2:
Use the Fundamental Theorem of Calculus to find the derivative of the functions defined below

1. \( F(x) = \int_{1}^{x} \frac{1}{t^3 + 1} \, dt \)
2. \( F(x) = \int_{0}^{x} \sqrt{t^2 + 4} \, dt \)

Task 3:
Evaluate the integral by making use of the given substitution

1. \( \int x^2 \sqrt{x^3 + 1} \, dx \), \( u = x^3 + 1 \)
2. \( \int \cos^3 \theta (\sin \theta) \, d\theta \), \( u = \cos \theta \)

Task 4:
Evaluate the indefinite integral

1. \( \int e^{\sin x} (\cos x) \, dx \)
2. \( \int \frac{\sin \sqrt{x}}{\sqrt{x}} \, dx \) [Hint: use \( u = \sqrt{x} \)]

Task 5:
Evaluate the integral

1. \( \int x \cos (5x) \, dx \)
2. \( \int (\ln x) \, dx \) [Hint: You can think of 1 as \( g'(x) \) in the formula \( \int f(x) g'(x) \, dx = f(x) g(x) - \int f'(x) g(x) \, dx \)]