1. Evaluate the integral 
\[ \int x^2 \cos 4x \, dx \]

2. Evaluate 
\[ \int \frac{x^3}{\sqrt{x^2 + 25}} \, dx \]
3. Evaluate
\[ \int \sec^4 x \, dx \]

4. Evaluate the integral
\[ \int \frac{x^3}{\sqrt{1-x^2}} \, dx, \text{ where } |x| < 1. \]
5. Solve the differential equation
\[ x \frac{dy}{dx} = 3x^2y^2 - y^2, \quad y(0) = 1 \]

6. Find the general solution of
\[ (x^2 + 1) \frac{dy}{dx} + 3xy = 6x \]