Show all your work in answering the following questions. Simply writing the answer is not acceptable. Staple all your pages together. The professor is not responsible for lost pages.

1. Perform the following integrations.
   (a) \( \int x^2 \sin(x) \, dx \)
   (b) \( \int x^2 \ln(x) \, dx \)

2. Perform the following integrations.
   (a) \( \int \frac{3x}{(2x + 1)(x - 2)} \, dx \)
   (b) \( \int \frac{1}{x^2(x + 1)} \, dx \)

3. Find the first three non zero terms of the Maclaurin expansion of the given function using the definition of the Maclaurin series

   \[ f(x) = \cos(3x) \]

4. Evaluate \(\cos 4°\) using the terms of the appropriate Maclaurin series.

5. Find the first three nonzero terms of the Fourier series for the given function:

   \[ f(t) = \begin{cases} 
   0 & -2 \leq t \leq 0 \\
   t & 0 \leq t \leq 2 
   \end{cases} \]